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APRIL, 1845.

## CIVIL ENGINEERING.

### *Connecting-Crank.* By Elijah Galloway.

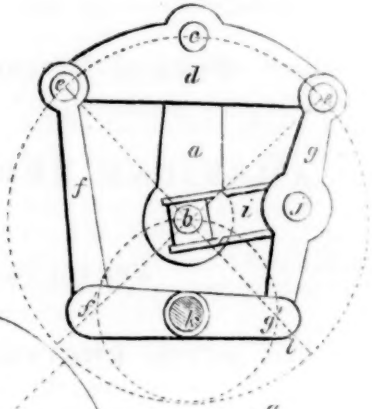
This machinery, or apparatus, for connecting two shafts so as to cause the same to revolve at different velocities, is illustrated somewhat in the following manner:—

Let *a b*, fig. 1, represent the pitch line of two wheels, the wheel *a* being twice the diameter of the wheel *b;* then for every revolution of the wheel *a*, the wheel *b* will make two revolutions, and if a tracing point be attached at *b'*, it will describe the straight line *a a'* upon the face of the larger wheel, and if another tracing point be attached at the opposite side of the small wheel *b*, such points will describe straight lines at right angles to one another during the revolution of such wheels.

In fig. 2, is shown an elevation of the arrangement of levers for connecting two shafts together, so that they may revolve at different velocities. Fig. 3, is a plan of one of the shafts which is provided with a crank forming a portion of the apparatus. In fig. 2, *a* is a crank, fixed upon the end of a shaft *b*, supported by suitable bearings; *c* is the crank pin which supports the triangular arm *d*, through each end of which there are pins *e e*, in the same plane with the aforesaid shaft, these pins support two connecting rods *f g*, the lower end of the connecting rod *f* being attached to the crank *f'*, shown in the plan, the lower end of the connecting rod *g* being attached to the crank pin *g'* of the plan; *b* is a pin fixed into the end of the shaft which carries one end of the connecting link *i*, the opposite end being attached to

the centre, or middle, of the connecting rod *e*, by the pin *j*; *k* is the axis of the shaft which is to receive motion from the shaft *b*, or *vice versa*; consequently, if *g* be double the length of the connecting link *i*, the point *g'* will describe a straight line *l l*, and if we suppose *g* to be attached at its lower end to the crank pin *g'*, and also the rod *f* to the crank pin *f'*, and that the axes *b* and *k* revolve in suitable bearings, *k*, will make two revolutions whilst *b* makes one revolution.

Fig. 2.



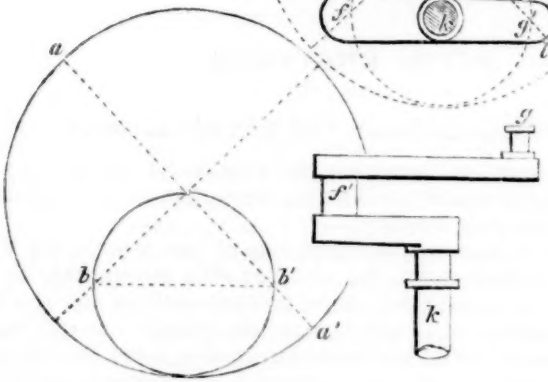




Fig. 1. Fig. 3.

There are other modifications of the above apparatus shown, for which the inventor claims machinery described for connecting axes, or shafts, to revolve in connexion at different velocities.

Civ. Eng. and Arc. Journ.

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## *Accident in a Spinning Mill at Dundee.*

An accident happened in this town last week at one of the spinning mills, attended by serious consequences; a young man having lost his life, and the person that attended the engine, and several others being severely hurt. The accident occurred in the following manner:—After the engine was started in the morning, and before the

machinery in the mill was connected, it got off at full speed, and the motion was accelerated to such a degree, as, from the centrifugal force it had acquired, to break the fly-wheel into a great many pieces before the fireman could stop the engine. The broken pieces of the ring and arms flew in all directions through the side walls of the engine-room, and also through the ceiling above. After the accident it was found on examination that the throttle valve was broken in two pieces, and was, consequently, rendered useless as a regulator. To prevent the recurrence of accidents of this nature, a very simple contrivance might be adopted, which is as follows:—Place an additional valve in the steam pipe between the boiler and the engine, as near the latter as possible; let this valve be wrought by an apparatus connected with the governor, so arranged that when the engine exceeds its *fastest* speed the governor balls, by their centrifugal force, would act upon the apparatus so as to shut the valve. This might be effected in various ways, and would prevent the engine from attaining such dangerous degrees of speed.

The common throttle-valve and governor is certainly a most admirable and efficient contrivance; but in cases like the present, when the valve happens to break, the governor loses all control over the engine. At this moment, the above-mentioned appliance would come into action, and check the engine in time. It is not uncommon to have a separate shut-off valve of this description applied to engines to be wrought by hand by the engine-man, and it is found to be a very convenient way of regulating the motion of the engine until the belts, &c., are put on, and the engine has its regular work to perform. All that I would suggest is, that this valve should be connected with the governor, or otherwise, so as to be *self-acting* when the ordinary throttle-valve is disqualified for performing its proper duty, which might happen when the fireman was negligent, or absent from his post; but it is easy to perceive that, independent of these contingencies, very little time indeed is sufficient to allow the engine (especially if in good working order, and lightly burdened,) to attain such a high velocity as to work destruction before the fireman could get it checked. The accident at Dundee is a verification of the truth of this remark. The poor fellow that lost his life was struck by one of the pieces of the fly-wheel when in the act of running from the lower flat of the mill to convey intelligence of the accident to the fireman; and sufficient time had not elapsed to afford an opportunity of shutting off the communication between the engine and boilers, by the valves generally placed on the top of the boilers for this purpose. Certainly, the ordinary way of stopping the engine might have been resorted to, viz., to throw the eccentric rod out of gear; but this was not done in time nor would it be likely to be attended to in most cases of this nature.

I may mention, in conclusion, that the engine was of twelve horse power. The fly-wheel had been found deficient in weight, and in consequence pieces were put on the ring to increase the momentum of it. The original ring was cast in six pieces, or segments, and held together by the arms, which were cast in one piece, overlapping the joints, and secured by bolts. On examining the fractures it was evi-

dent the arms had broken first across where they joined the ring. In measuring the section of this part of the arms, and calculating their ultimate strength by Tredgold's rules for the strength of cast-iron, the centrifugal force, or tensile strain, must have exceeded 30 to 35 tons on each of the arms before they had given way. The wheel was 12½ feet in diameter, and sufficiently strong, even with the enlarged ring, to withstand the strain upon it while the engine moved at its ordinary speed; this was proved by the experience of a considerable number of years. C.

*Dundee, 25th December,* 1844.

Glasgow Mechanic and Engineer's Magazine.

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### *Locomotive Engine Explosions.*

We have to record the occurrence of the *second* important explosion of a locomotive boiler—for we reckon the boiler of the iron steamer Telegraph, a locomotive boiler in all essential respects—that has occurred in this country. It took place on the 11th ult., upon the Dover Railway, with the engine "Forrester," in connexion with a goods train of twelve luggage wagons, on its way to Dover. It is stated that two successive explosions took place, the second one being of by far the greater force. As soon as the steam and smoke had cleared away, the line was found to be completely blocked up with wagons, which were spread across the whole line, and piled on each other; the engine had gone over the viaduct, and was partially buried in the earth beneath, whilst the tender was hanging over the side of the viaduct, torn and folded together like paste-board, its carriage having fallen about twenty yards from where the engine lay. The engine-driver was found dead; the stoker was found nearly dead, with the whole of his jacket, except the cuffs, blown off his back, and was conveyed to Guy's hospital. A strict examination into the circumstances of the accident was instituted, and the result is shortly as follows:—

The bursting of the locomotive being the supposed cause of the accident, their first object was to examine the engine as it lay imbedded in the earth. After getting off the viaduct it had pitched head foremost into the earth a depth of four feet, and then turned over. They found the fire-box was blown out, as well as the fire-bars, and the inner casing, between which and the outer casing the steam generated, were also torn away. The next point was to examine what effect the explosion had upon the viaduct, and the probable cause of the engine getting off the line. They found that there had been two explosions—the first apparently took place about eighty feet from the spot where the engine was lying. The fire-bars at the bottom of the fire-box had been blown completely through the viaduct into arch No. 134, making a hole three or four feet square. The second explosion, the more severe of the two, not only blew the fire-box through the arch No. 133, but such was the force of the steam,

that the engine "jumped," and descended partly on the rails, and partly off, a distance of eight or ten yards, crushing the immense pieces of timber that supported the viaduct. It was deposed by Mr. Bury, of the firm Bury, Curtis & Kennedy, the makers of the engine, that he could account for the explosion only by the excessive pressure of the steam, arising either from want of freedom of the safety valve, or from a deficiency of water in the boiler.

Ibid.

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*Description of several* WATER-WHEELS *called* "TURBINES," *exhibited at the Exposition de l'Industrie Française, at Paris.*

Knowing the earnest desire of the scientific public for information, and the interest which attaches to French ingenuity and mechanical skill, we have availed ourselves of the valuable reports of M. Burat, C. E., to give an account of some of the most remarkable and interesting objects exhibited at the recent Exposition de l'Industrie Française, at Paris. A feature quite novel to us is the number of turbines exhibited, a class of machine, of which, we believe, no specimen exists in England, and of which the only description is a slight sketch by Mr. George Rennie, C. E., who has not, however, introduced any mention of it in his edition of Buchanan's Millwork. In France, however, we suppose that at least a hundred must be now in operation, and they must undoubtedly be successful, or they would not so early have secured the patronage of a class so prejudiced as the French millers.

*Hydraulic Machines.*—Not the least interesting section of the Exposition was that devoted to hydraulic apparatus. The *rapporteur*, in introducing the subject, says—"Many people imagine that the first cost and fitting up an hydraulic motor are less than those of a steam engine. What has had a great influence in propagating this error has been that the establishment of hydraulic motors generally took place under such unfavorable conditions, and on such a defective system, that the first expense was diminished at the expense of the power of which only a third, or fourth, was utilized. When, however, we calculate, beyond the purchase of the right of water, and the adjoining ground, the construction of dams, head of water, mill race, and wheel well made, we shall find that for an equal amount of power, the fitting up of a steam engine is less expensive. The advantage, however, of hydraulic motors is, that though the cost of establishment may be considerable, the cost of maintenance is next to nothing, and the charge only the interest of the money laid out." It is calculated that the amount of water power utilized in the factories of France is equal to 20,000 horse power, though from the bad construction of the machinery it is supposed to be under estimated, and that the real power of the water is at least double.

Many endeavors have been made by men of science to improve this state of affairs, and latterly, a great deal of attention has been directed to the turbine. Under the general name of turbine are included water-wheels formed on very different principles, and which

have nothing in common but the property of all turning on vertical shafts. M. Burdini, mining engineer, first imagined and made known, under the name of turbine, machines which received the water in the upper part of a vertical cylinder, or drum, and eject it from the lower part; the water is guided by vertical channels in the rim of the drum, which must have a height equal to half the entire height of the available fall of water.

M. Fourneyron has occupied himself a good deal with turbines, and the model of one erected at the mills of St. Maur, near Paris, was exhibited. In Fourneyron's turbine the drum is always made rather narrow. The water glances obliquely in horizontal jets on the whole contour of an internal vertical cylinder, and penetrates in every direction the compartments of the wheel, which, in turning, just touches this external cylinder, and follows by passing the curved buckets, or chambers, enclosed in the horizontal bases, and escapes horizontally from the external rim of the drum.

The construction of turbines suggests the most complicated problems of hydraulics, and theory has not yet afforded the means of solving them *á priori;* practice alone gives any solution at present. The greatest difficulties in the turbine are in the details of execution. The water to produce the maximum effect must enter without shock, and leave without velocity. M. Fourneyron has constructed several turbines, but he has not made known the proportions which he gives to them. From the experiments of M. Savœry, it was established that even with falls so slight as one foot, up to 3, 10, 15 and 25 feet, the disposable work transmitted by the turbine reached from 7 to 8-tenths of the motive power.

Turbines, of all hydraulic wheels, are those which under the smallest volume of water utilize the greatest quantity. The water which propels them does not press on the axis. The high and variable speed which can be given to them, without sacrifice of power, allows the abandonment, in many factories, of a quantity of mill work and heavy spindles, for the purpose of accelerating the movements. Another property of the turbine, and perhaps the most important, is that of working when it is completely immerged in the stream a fraction of the absolute power at least as great as when working above. This allows, at all times, the whole fall of a stream to be turned to account. From this property, M. Arago has conceived the plan of establishing a complete system of turbines on the Seine, in order to provide for the supply of water to Paris.

M. Fontaine Baron has sent to the Exposition a turbine of 18 h. p., which much resembles that of M. Fourneyron, though differing in some details, and particularly in the direction given to the chambers, or buckets. M. Fontaine, who lives at Chartres, has already constructed thirty or forty in that part of France, where the corn trade is a principal one. M. Taffe has frequently applied a register to M. Fontaine's machine, and certified the useful effect to be seventy-nine per cent.

*Kœchlin's Turbine.*—M. A. Kœchlin also exhibited a turbine patented by him, the construction of which consists of two hollow

conical centres surrounded with helical blades *a* and *d*, the upper one *d*, is fixed, and serves as a guide for the flow of water on to the blades of the lower one *a*, called the turbine; by the force of the current the

Fig. 1.

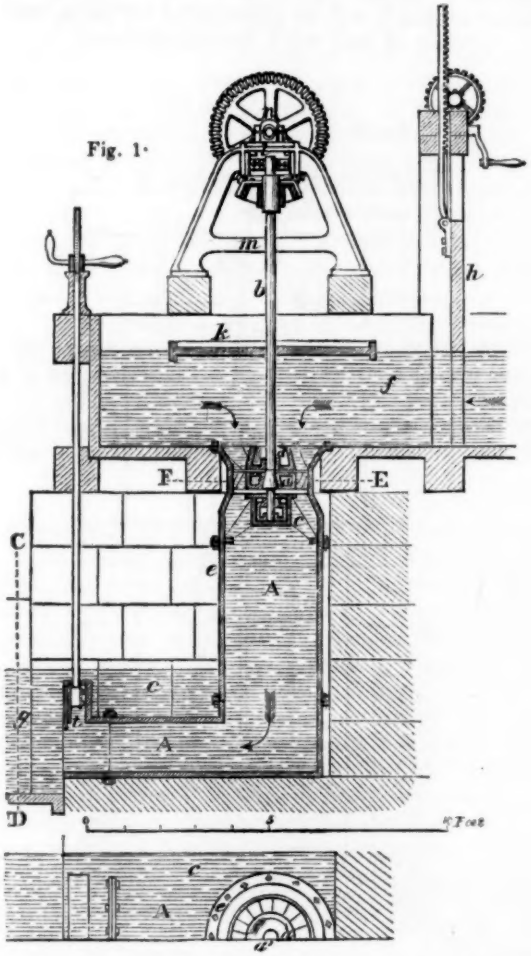
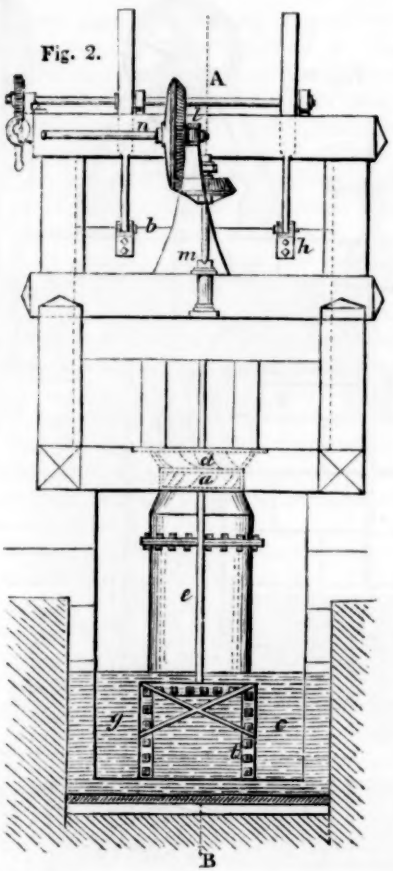



Fig. 3.

water causes the turbine to revolve, and with it the vertical shaft on which it is keyed, and the beveled wheels above. Both the fixed and movable turbines are placed within the mouth of a tube, the orifice of which is contracted in such a manner as to allow the proper quantity of water to pass through, that is due to the velocity arising from the difference of two levels of water above and below the turbine. The advantages of Kœchlin's turbine are, that the turbine may be placed at any point taken in the height of the fall according to

circumstances, the inferior column may be prolonged at will. Also, the action of the water acts simultaneously by the pressure of the inferior column, and from this combination the inventor has called his machine the double-acting turbine. This system of construction offers advantages which will be appreciated by those who are aware of the great expense of mill work for foundations.

Fig. 2.




It is sufficient for these turbines to place below the surface of the lower level the conduit for conveying the descending current, with a regulating sluice at the end, and to fix the stay block which receives the arbor, or point, of the shaft in the interior of the tube at the most convenient height, taken between the surfaces of the two levels. In this manner it is always easy instantaneously to run the wheel dry, and so keep it underhand. The turbine is also provided with a sluice for its supply, and when it is required to be put in motion it is opened to give passage to the water, and the receiver is first allowed to be filled completely up to above the turbine, when the discharge sluice

is opened, and the water allowed to flow out in quantity and relation to that of supply, so that the column within the receiver is always kept to one level.

*Reference to the Engravings.*—Fig. 1, vertical section of the turbine through A B, of fig. 2. Fig. 2, transverse elevation taken through C D, of fig. 1. Fig. 3, horizontal section through E F, of fig. 1. The same letters are used for the same parts in each of the three figures.

*a*, water-wheel called the turbine; *b*, shaft of the turbine; *c*, block, or step, supporting the axis *b*; *d*, guide, or *fixed turbine*, supplied with helical curves which serve to give to the fluid vein the desired direction; *e*, case of the turbine; *f*, upper channel; *g*, lower channel; *h*, sluice of the canal *f*, to regulate the flow to the turbine; *i*, sluice of the canal *g*; *k*, float; *l*, upper collar of the shaft *b*; *m*, support of the collar *l*; *n*, bevel wheels and shaft of transmission, supported by another collar, which, like the former, is secured to the support *m*.

Fig. I, represents the water of the upper channel *f*, in communication with the lower channel *g*, passing through the guide *d*, the turbine *a*, and the case *e*, which may properly be called the channel of junction. It is by passing through the turbine *a*, that the water impresses on it a rotary movement in the direction indicated by the arrow *a'*, figure 3, a direction which would be inverse if the guides, as well as the vanes, of the turbine were inclined in the opposite direction.

*Passot's Turbine.*—M. Passot also exhibited one of his turbines, (see figures 4 and 5,) the construction of which is founded upon using reacting wheels, and produced by the effect of centrifugal force. They are composed of cylindrical vessels fixed to vertical arbors, and supplied at the circumference with orifices intended for the introduction, or ejection, of the water. The modification which M. Passot has introduced into the old reacting wheels, and which he claims as his invention, consists of having suppressed, or got rid of, the internal partitions, and reduced the old wheels to their only true essential elements—a motive cylinder to contain the motive fluid, with surfaces to receive its action, and corresponding orifices for discharge. The surfaces and the orifices are exactly included between two concentric circumferences, that is to say, that he carefully retrenches all other surface, or projection, capable of impressing the water with the angular movement of the wheel before having reached the parts destined to receive its action, as well as the orifices of discharge. "I form the new wheel," says M. Passot, "simply by placing either in the interior, or exterior, of a cylindrical drum, according as I want the pressure of the fluid to be exerted on the interior, or exterior, curved vanes in the arc of a circle, such as *a b c d*, figures 6 and 7, then I make orifices of discharge, by removing from these vanes and from the cylinder the part in form of a wedge, *a b d*, and the motion is effected by virtue of the pressure on the faces *c d*, *c' d'*, *c'' d''*.

"While the machine is very simple, its properties are very remarkable. When the wheel turns without load, or work, under a given difference of level, or fall, its vanes take exactly the theoretical velo-

city due to the fall. It is no longer the same when in any manner the form of the new wheel is altered so as to approach those formerly

Fig. 5.




Fig. 4.

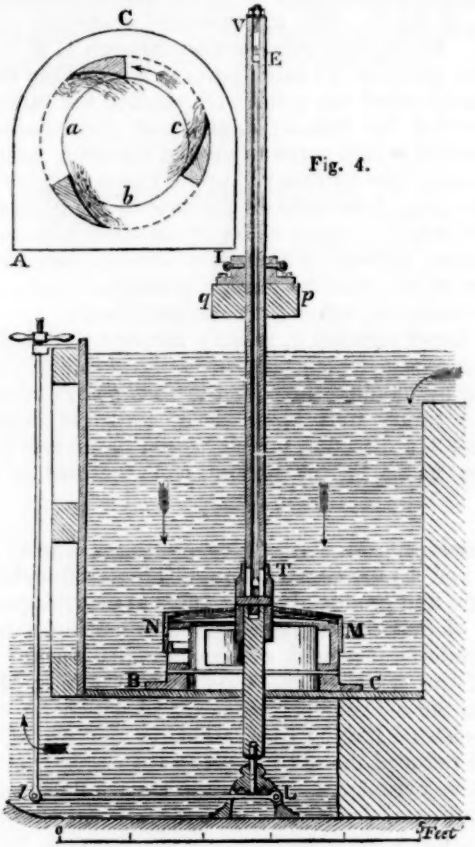



Fig. 6.

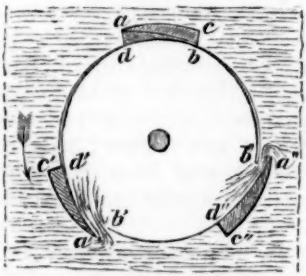
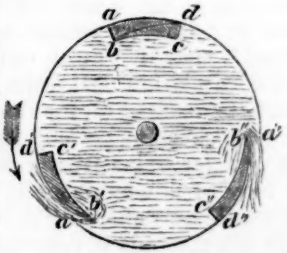



Fig. 7.




known; all partitions, projections, and asperities which are either

within, or without, two concentric circumferences, considerably diminish the theoretic velocity of rotation due to the fall, on account of the continual shock of these bodies in motion against the water in repose. Then it is not surprizing if the useful effect of reacting wheels when experimented upon has never risen above fifty per cent., that is to say, about the rate of breast wheels of the usual varieties.

"The expenditure of water in figure 7, with the internal action, is sensibly independent of the greater or less reaction of the wheel. In figure 6, with external action, this cannot take place on account of the counter pressure arising from the formation of an eddy in the interior; but this counter pressure is, however, much less than might be supposed. I have demonstrated that when a fluid forms an eddy in the interior of a cylinder, the effects of the centrifugal force show themselves differently according to the different inclinations of the projections, or orifices, made on the circumference.

"In No. 1, the orifices are disposed in the direction in which the centrifugal force can least influence the expenditure of water. Thus the coefficient of theoretical expenditure due to the work, during the experiments on the turbine, which I constructed at Bourges, has been found very little different from that which agrees with the openings of ordinary sluices disposed so as to avoid contraction on three of the sides. The wheel which turned in work, with about half the velocity due to the fall, and the coefficient was 0.70 to 0.79."

Explanation of the engravings of Passot's turbine, *a b c*, figure 5, plan of the wheel. A B C, fixed base of cast-iron. M N, cover acting as a sluice to regulate the expenditure of water. *p q*, block of wood carrying the step of the arbor, or shaft. E V, male and female screw, serving to regulate the cover by means of the rod T *t*, passing through the hollow shaft. L *l*, lever to raise the whole motive system by means of the pivot.

M. Poncelet, adopting an arrangement the reverse of that of M. Fourneyron, has proposed a system of turbines of the nature of the horizontal wheels used in the centre and south of France. The water enters by a spout placed on the outside, stretches the vanes, and is discharged by two openings made towards the centre. M. Cardelhac has constructed at Toulouse turbines on this plan, and Messrs. Mellet, and Sarrus, of Lodeve, have exhibited one with the same arrangement. The principal part of their turbines consists in a case of particular form, provided with three openings, of which one is for the water to enter, and the two others to allow it to escape after its action on the wheel. In consequence of the spiral form of this casing, the water arrives on the wheel placed in the interior without any shock, and with a velocity due to half the height of the fall. Each of these veins, or streams, of water acts at the same distance from the axis, as if it were isolated and independent of the other; its velocity is transformed into pressure by insensible degrees, and without any loss of power. Messrs. Mellet and Sarrus have already put up several of these turbines in the south of France with good results. They come cheap, one for an ordinary grist-mill costs 40*l.*, one of 12 or 20 horse power, well finished, and of good material 120*l.*

There was at the exposition another hydraulic machine, which the maker, M. de Lamolere, calls a piston wheel. This machine receives water like a breast wheel. The water brought by means of a plunging fan, falls into a bucket, where it stretches a wooden valve, fitted with leather. It passes through this valve, which is followed by a second also. These successive valves turn horizontal shafts, which then give movement to the factory.

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## AMERICAN PATENTS.

*List of American Patents which issued in the month of August, 1844, with Remarks and Exemplifications. By* CHARLES M. KELLER, *Examiner of Patents.*

1. For improvements in *Tanneries, and the Handling of Hides;* Wm. Brown, Manchester, Carroll county, Maryland, August 1.

Claim.—"What I claim as my invention, is constructing the leaches and vats so that the liquors pass through the top strainer of one leach into the bottom of the next throughout the circuit, or direct to the pump, and are returned from the vats, after being heated, to the bottom of the leaches, and in combination therewith the arrangement of tanks, stocks, and spiggots, by which I effect these objects. I likewise claim the revolving rollers of the tanning and liming frames for accommodating the hooks to the shrinking of the hides, and the manner in which I arrange the two shafts, connected and operating as described, for working the tanning and liming frames to which the hides are suspended, and in combination the reels and shafts for handling, baiting, and washing; likewise the manner in which I arrange the railroad and car, with respect to the mill, and the leaches by which the bark is conveyed direct to the leaches, and deposited therein."

The leaches are provided with perforated false bottoms, on which the hides are placed, so that the liquor can be admitted from below by means clearly indicated in the claim. They also communicate by means of hollow trunks, with the vats, &c. The tanning and liming frames are provided with rollers armed with teeth, to which the hides are attached, and which yield to the shrinking. These frames are hung to arms projecting from shafts so linked together, and connected with a crank shaft that, as one descends the other rises, and vice versa. The reels to which the hides are suspended in the vats are operated by hands extending from a rocking shaft, also connected with a crank shaft, by which the handling, baiting, and washing are effected. Above the four leaches, which are arranged around the shaft of the bark-mill, there is a circular railway with a car to receive and convey the ground bark to any of the leaches, the car being provided with a drop bottom, and a catch, by which it can be attached to, or detached from, an arm on the mill shaft.

2. For an improvement in the *Scrubbing Brush;* George Carver, Chambersburg, Franklin county, Pennsylvania, August 1.

The handle of the brush is connected with the block by means of a pin joint to secure an equal bearing of the brush on the floor, and insure its wearing equally, instead of at the edges, as when the handle is fixed.

Claim.—"What I claim is the application of the joint and hinge to the scrubbing brush and block, whether in, on, or at the side, so as to operate in the manner and for the purpose described and set forth."

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3. For improvements in machinery for making *Wrought-Iron Butt Hinges;* Cyrus Kenney, Troy, Rensselaer county, New York, August 7.

In the making of butt hinges of wrought-iron, the two halves are cut from sheet-iron plates, by machinery for that purpose, with projecting pieces from which the knuckles are to be formed; these projecting pieces are first partly bent by one operation, and then completed by a machine, patented some years ago by a Mr. Rouse. The first of these bending operations is effected under this patent by an arrangement consisting of a rest-die attached to the bed of the machine, and two dies and a gauge attached to one end of a working lever. The face of the gauge is at a distance from the inner edge of the rest equal to the space between the end of the tongue on the hinge plate, and that part where the bending is to be commenced, and the two dies are attached to the lever, forward of the gauge, one of them to strike the metal between the gauge and rest, and the other immediately over the rest. The knuckles after being completely bent, which operation elongates them, have to be trimmed off, or up-set, and the second improvement under this patent, is to effect the latter object, which is done by means of two dies, one permanent and the other sliding, the space between the two, when nearest to each other, being equal to the required length of the knuckles. These dies are grooved and mortised to receive the flaps of the hinges, and thus bring the knuckle to be upset between the faces of the dies; there are also mortises in the dies to receive the knuckles that are not being upset.

Claim.—"What I claim is the method of bending the ends of the projecting pieces which are to form the knuckles, by combining the rest, dies, and gauge, under an arrangement substantially as set forth, and so as to adapt them to the partial formation of the knuckles of the butt hinges. I also claim the method, herein described, of upsetting the knuckles of the butt hinges, by providing the pressing dies with grooves and mortises, or openings, to hold the flap and receive the knuckles, for the purpose and in the manner described."

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4. For a *Corselet for Curved Spines;* Alanson Abbé, Roxbury, Norfolk county, Massachusetts, August 7.

This corselet is made of iron and other appropriate material in two parts, one adapted to the shoulders, the other to the hips, the two

being connected together by an elastic strap along the middle of the back, or spine, so that the position of the two can be changed at pleasure.

Claim.—"What I claim consists in the described mode of making the back of a corselet, viz., in constructing the same of two parts, and jointing them together, and otherwise arranging them with respect to each other, as set forth, and connecting them by an elastic strap, or straps, or other proper elastic materials, which have, or have not, means of increasing their elastic force, the whole being substantially as specified."

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5. For an improvement in *Lamps for Light-Houses;* Winslow Lewis, Sr., and Benjamin Hemmenway, Roxbury, Norfolk county, Massachusetts, August 7.

These improvements are adapted to the kind of argand lamps employed in the light-houses of the United States; and the first consists in making the inner tube of the burner in two parts, the upper part being a ferule slipped on to the main body of the tube, so that when injured by the action of the flame it can be removed, and another substituted; and the second improvement is for an arrangement to support the chimney by means of brackets attached to the outer tube of the burner at sufficient distance apart to admit of turning the wick by a milled rim attached to the ferule which carries the wick tube.

Claim.—"What I claim is as follows, viz., a movable cap, or ferule, applied to, or slipped upon, the inner air tube of the burner for the flame to act upon, instead of the top of the inner tube, as heretofore arranged; also the above described mode of sustaining and arranging the supports of the glass chimney, with respect to the tube, and milled rim thereof, by which, in connexion with the other mechanism, the wick is elevated and depressed; the ordinary kind of glass holder being thereby dispensed with, and the wick raised and lowered without turning the chimney, or lamp glass; thus preventing the chimney from being smoked on one side, or its interior surface, as often takes place in lamps where it is supported upon a glass holder as ordinarily constructed; the whole of the above being substantially as explained."

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6. For a machine for *Rolling Irregular Figures to a Pattern;* William Field, Pawtucket, Providence county, Rhode Island, August 7.

This is for a modification of the rolling mill, and consists of three rollers arranged one above the other; the bearings of the bottom one being permanent, the upper one movable, and provided with set screws for adjustment, and the third, or middle, one movable up and down between the other two, the upper and the lower one being geared together to insure their moving with equal velocities. A pattern of a wedge-like, or other desirable form, is placed between the middle and upper roller, and the piece of metal to be rolled between the middle and lower roller, from which arrangement it will be evident that the pattern in passing through will, by its irregu-

larities, cause the space between the middle and lower rollers to increase and decrease, and thus give the desired form to the article to be manufactured, provided the passage of the metal to be rolled be carried through with the same velocity as the pattern.

Claim.—"What I claim is the employment of the rollers combined and arranged in the manner and for the purpose set forth, in combination with the pattern, for the purpose described."

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7. For improvements in the method of making *Vessels of soft metal*, such as are used for containing pigments for artists, &c.; John Rand, a citizen of the United States, now residing in England, August 7.

The patentee says,—"My invention relates, first, to a mode of forming thin metal vessels of metal tin, and other metals sufficiently malleable to be operated on by the process of pressing the same into the depth of vessel desired; and secondly, my invention relates to a mode of making a screw on the neck, or nozzle, of metallic vessels, and also the mode of making screw caps."

Claim.—"I would have it understood that I do not confine myself to the precise details shown, provided the peculiar character of my invention be retained: but what I claim is, first, the mode described of making soft metal vessels by causing a thick piece of metal to be pressed in the required form, by pressure of dies as is described; secondly, I claim the making a screw by pressure in dies on the necks of metal vessels; and thirdly, I claim the making of metal screw caps by pressure, as described."

The method covered by the first section of the claim, is to place a piece of soft metal in a matrix, of the form of the intended vessel, but of less length, and to make pressure on it by means of a metallic follower of the form of the inside of the intended vessel, which will force the metal out of the matrix, cause it to form around the follower, and to assume externally the cylindrical form of the matrix. The method of making screws on the necks of soft metal vessels, is to place the end of the soft metal vessel within a die having the form of the intended screw, and then forcing a conical die within the neck which forces the soft metal into the threads of the matrix; and the method of making screw caps, covered by the third section of the claim, is the reverse of the preceding method.

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8. For a machine for *Turning Scythe Snaths, or Handles*, and other similar articles; James Ombree, Marshalton, Chester county, Pennsylvania, August 7.

The timber is first prepared and reduced to an approximate form by a saw-mill with a double carriage—the lower one in the usual manner of saw-mill carriages, and the second, or upper, one resting on the first and moving longitudinally with it, there being a roller at each end of the second carriage bearing against transverse ribs projecting upwards from the first, or lower, carriage, to prevent the upper

one from moving lengthwise, but to admit of lateral play. The upper carriage is provided with clips near each end which embrace a guide of appropriate form, so that the saw, which is operated in the usual manner, shall cut the timber of the form required.

The piece of timber thus prepared is presented to the turning instrument by means of two parallel feed rollers, and two guides parallel with each other, and at right angles with the axis of the feed rollers; the two rollers are kept in their parallel relative position by means of links, in the manner of parallel rulers, and the two guides in the same manner, and these two sets are so arranged and connected with levers, that by means of weights attached thereto they always gripe the piece of timber.

The cutting instrument is attached to a hollow chuck, through which the piece of timber to be turned passes, the cutter projecting inwards, and as scythe snaths, and the other articles intended to be turned, are of a regular taper, it is necessary that the cutter should have a regular movement towards, or from, the centre of the wheel from the commencement to the end of the operation, which is effected by having the chuck which holds the cutter made in two parts, one turning on the other, the cutter sliding in the inner part, and being connected with an eccentric groove in the outer one, which moves the cutter in or out, as the two parts turn on each other, and to effect this the two parts are connected together by gearing in such manner that, as the whole chuck rotates with great rapidity the two move on each other with a very slow motion, the difference between the two giving the necessary motion to the cutter. There are three guides, or rests, which correspond with and move in like manner as the cutter.

Claim.—"What I claim is, first, the manner in which I have arranged and combined the apparatus for sawing the stuff to the proper curvature, said combination consisting of the first carriage, the second carriage with its friction wheels, the curved guide strips, and the clips with thin cylindrical stems received within holes in the ends of the second carriage, substantially as set forth. I also claim the manner of arranging and combining the two parallelograms in which the vertical guide pieces, and the toothed feeding rollers, are made to embrace, conduct, and direct the handle to be turned through the opening in the wheel, or chuck; the feeding rollers being made to revolve, and the other parts of the parallelograms being acted upon and governed as described. I claim the combination and arrangement of the parts employed in causing the cutter and guides to approach and recede from the centre of the wheel (chuck) during its rotation, as described."

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9. For an improvement in the machine for *Winnowing Grain;* Thomas Cole and John Littlefield, Allensville, Switzerland county, Indiana, August 7.

In this winnowing machine the fan is made with inclined vanes to throw the current of air in the direction of the shaft;—it is directed towards the middle of the screens by means of two vertical and oblique

wings attached to the frame between the fan and the screens. The grain passes from the hopper through two shaking horizontal screens, one above the other, and from the latter of these on to another which is inclined and permanent, the lower end of which discharges the grain into the upper end of a fourth and last that is inclined and rotating.

Claim.—"What I claim is, first, the arrangement of the wings in the manner and for the purpose set forth; second, the combination of the permanent inclined rectangular screen with the revolving cylinder screen as set forth."

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10. For an improvement in the *Truck Frames of Railroad Cars*; Charles Davenport, Cambridgeport, Middlesex county, Massachusetts, August 10.

The connexions between the pedestals of this truck frame instead of being made by means of solid pieces of timber extending from one pedestal to another on each side, are, by means of two tie plates of iron bolted together through the pedestals, one being above, and the other below; above the upper tie plate, and extending from one pedestal to the other, there is an arch plate connected with the pedestals by the same bolts that secure the tie plates. The two truss frames are connected together by means of diagonal iron plates bolted to the pedestals, and so twisted and connected in the middle as to form the opening for the king-bolt that secures the truck and car together.

Claim.—"I do not claim making the truck frame of a railroad carriage with side truss frames united with diagonal braces, as this has been known before, nor do I claim making these frames of iron, or other metal; but what I do claim as my invention, is making the trusses of the truck frame that are united and braced together by means of twisted diagonal plates, of arch plates, and tie bars, so arranged and bolted together as to embrace and secure the pedestals as described, by which arrangement I obtain the necessary strength with greatly reduced weight, and employ the pedestals for the double purpose of holding the boxes of the wheel axles, and connecting the tie bars of the trusses."

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11. For improvements in the process of manufacturing *Iron*, *Steel*, *Copper*, and other metals; Arthur Wall, Poplar, Blackwall, Great Britain, August 10, to run fourteen years from the 18th of November, 1843, the date of the English patent.

The first part of this invention consists in adding to the iron, while in a state of fusion in the smelting, puddling, balling, or reheating furnaces, certain compound masses, which the patentee has designated, for more clearly explaining his process, A and B.

The composition A, is a mixture of steel, or wrought-iron, in a comminuted state, such as filings, or fine cuttings, with melted rosin, in the proportion of two pounds of filings to five pounds of rosin; it is made into balls of five pounds each, and thrown upon the melted

iron, in the ratio of one ball to five hundred weight of metal. If preferred, instead of the rosin, other resinous substances, and the varieties of turpentine, asphaltum, tar, and pitch, may be substituted; and a few pounds of charcoal may be added to the composition. The composition B, is a mixture of common salt, rosin, and charcoal, or other carbonaceous matter, which is made into balls, and thrown upon the fused iron, after it has been acted upon by the balls A, in the proportion of one pound of the composition B, to each hundred weight of metal. Certain other fluxes, such as borax, nitre, or fixed alkalis, may be substituted for the salt.

The second part of this invention consists in subjecting the iron, while in a fluid state, and while in the act of solidifying, to a current of electricity, which is caused to traverse the whole mass.

In casting a bar, or similar mass, the electric current is caused to traverse from end to end, by conductors so arranged, that when the metal runs into the mould it may complete the electric circuit, or by means of a wire, or wires, passed from one end of the mould to the other. If the castings are horizontal, a piece of wrought-iron, or other conducting material, is placed at each end of the mould, which is made of sand, or other non-conducting substance: these conductors are then connected by wires with a galvanic apparatus, or voltaic pile, or electro-magnetic, or other battery, so that, when the melted iron is run into the mould, it will complete the electric circuit; and the patentee prefers to continue the electric current for some time after the iron has solidified. When the castings are vertical, a similar arrangement is made for the passage of the electric current through the metal, by placing a conductor at the top and bottom of the mould in such a manner that the electric circuit will be completed the moment the mould is filled with the liquid iron.

To apply electricity to iron in a smelting furnace, or cupola, a wrought-iron rod is introduced through, or at the side of, the tap-hole, until it comes in contact with the melting metal, and another wrought iron rod is introduced at the upper and posterior part of the hearth, or through one of the tuyere holes, until it reaches the metal; the outer ends of these rods being then connected with a battery, the electric current will be caused to pass through the iron; care being taken not to continue it so long as to entirely decarburate the iron, and bring it to a malleable state. When the electricity is to be applied to the iron in a puddling, or balling, furnace, two iron rods are also used; one of which is inserted into the fused metal, and the other end is connected with a battery; the other rod is attached to an insulating handle of porcelain, pottery, or other non-conducting substance, and a wire from the battery is connected to it, close to the handle. By means of the handle, the extremity of the rod is caused to traverse the iron in its melted state, or during its transition to the solid state, and the electric current will, therefore, pass through the metal in every possible direction.

Claim.—"What I claim as my invention is the improvement in the manufacture of iron, steel, copper, and other metals, by the use and application of electricity as herein described."

12. For an improvement in the mode of *Dressing Mill Stones;* John Black, Helena, Phillips county, Arkansas, August 10.

Claim.—"What I claim is the dressing of the outer edge of the bed stone flat and smooth to an extent and in the manner set forth, and the dressing of that part of the runner that corresponds thereto with lands, usually eight in number, and having their direction the reverse of those on the other part of the face, as described, and for the purpose set forth."

That portion of the bed stone dressed smooth is about one-third of the diameter of the face extending from the periphery inwards, and is reduced about a quarter of an inch below the face of the lands on the other portions of the face. There is a radial groove passing through the smooth part of the face, into which the flour is conducted by the eight lands on the corresponding part of the runner. The patentee says,—"By this mode of dressing the stones their friction is much diminished, and they may be made to run with greater velocity than when the lands on both stones extend to the circumference, whilst the quantity of grain which is ground need not be diminished."

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13. For an improvement in *Railroad Car Wheels;* Ebenezer A. Lester, Boston, Massachusetts, August 10.

The object of this improvement is to make a wheel cast in a single piece with a chilled rim, and without the necessity of a divided hub, as when cast with spokes. This has heretofore been attempted by uniting the hub and chilled rim, or tread, with a dished disk, or two such disks; and the present improvement is for giving to the disk a double wave, or a convexity and concavity on each face.

Claim.—"What I claim as my invention, is the casting of such a wheel with a single continuous plate, or disk, uniting the chilled rim to an undivided hub; said plate being so formed as that a plane bisecting the wheel in its axis shall present a waved line, or one having a convexity on each face of the wheel, in the manner described, and for the purpose set forth."

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14. For improvements in the *Shingle Machine;* Israel G. Johnson, Augusta, Kennebec county, Maine, August 12.

We are under the necessity of omitting the claims of this patent on account of their entire dependence on the drawings, to which reference is made, and as the two improvements claimed are only modifications of machines for sawing shingles which are well known, and in general use, and they could not be understood without drawings of the whole machine, we do not deem it sufficiently important to give the drawings. The first improvement is for an arrangement of gauges for limiting and regulating the length of movements of the carriage; and the second is for so connecting the racks that set the bolt of wood for cutting the shingles with the butt from alternate sides, with the dogs that hold the bolt in such manner that the same thickness of butt can be given for all lengths of shingles, the sliding dogs being connected

with the racks by means of a pin on the dogs which slides in a slot at the end of the racks.

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15. For an improvement in the process of *Silvering Looking-Glasses;* Thomas Drayton, Brighton, England, August 12, to run fourteen years from the 25th of November, 1843, the date of the English patent.

[See Specification of English Patent, vol. viii, 3d series, Journal of the Franklin Institute, page 193.]

Claim.—"Having thus described the nature of the invention, and the means pursued in performing the same, I do not confine myself to the precise details herein explained, provided the peculiar character of the invention be retained; but claim to deposite silver on glass from an oxide of that metal in solution by the new process substantially as herein described, wherein I make use of suitable deoxidizing matters in such manner as to cause the silver to adhere to glass without any previous preparation of metallic coating."

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16. For an improvement in *Water-Wheels;* David Putney, Red Bank, Armstrong county, Pennsylvania, August 12.

The wheel is on a vertical shaft, and consists of spiral buckets attached to, or projecting from, a conical hub. This wheel is placed within a "revolving scroll" which communicates directly with the floom to conduct the water to the wheel. The revolving scroll contains two channels which gradually approach the wheel until at their extremity they nearly touch the outer edges of the buckets, so as to enable the water from the floom to strike several buckets at once. The floom is double, entering from opposite sides, one division of the "scroll" communicating with each of them, and the scroll is made to revolve for the purpose of regulating the quantity of water to be admitted to the wheel. The water is discharged at the bottom of the wheel after acting by gravity on the spiral buckets.

Claim.—"What I claim as my invention, and which I desire to secure by letters patent, is the combination of the revolving scroll and trunk, (flooms) and also in combination therewith the wheel arranged and constructed as described."

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17. For an improvement in the *Tongueing and Grooving apparatus of Planing Machines;* Charles W. Brown, Boston, Massachusetts, August 14.

In the planing machines in general use the rotating cutters for tongueing and grooving boards, are so arranged as to be adaptable to boards of various widths, but this setting must be changed for every width; but the improvement is as stated by the patentee, "for the tongueing and grooving of boards of various widths, and superseding the necessity of an adjustment of one of the cutting tools for each board that is to be operated upon; it is peculiarly adapted to the tongueing and grooving of boards of a tapering, or irregular, shape,

and this constitutes the great merit of the invention, as the only requisite preparation of the board, before its introduction to the machine, is the making of one edge straight."

Claim.—"What I claim as my invention, is making either the tongueing, or grooving, tool self-adjusting, by arranging the box, or bearing, of the shaft of either of the said tools, so as to slide laterally on a rail, and connecting said box, or bearing, to a sliding guide bar, which bar is governed, or regulated, in its movements by the edge of the board, and kept up against said edge by means of a weight operating upon it, (so as to press it laterally,) through the medium of a rack and pinion, as set forth, the mechanical arrangement and operation being substantially as specified."

There is another claim to a subordinate arrangement of parts which we are under the necessity of omitting, as it refers to, and is wholly dependent upon, the drawing.

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18. For an improvement in the *Smut Machine for Cleaning Grain;* John Pagin, Michigan City, Indiana, August 14.

The patentee says,—"The nature of my invention consists in combining and arranging the fans and beaters of a smut machine, the concave of which is pierced with holes, so that there shall be an equalized current of air upward between the concave and beaters, and an outward current through the cylinder, or runner, and concave."

The runner is vertical, and has a fan at the lower end with two sets of vanes, the first at an angle of about 45 degrees with the shaft, and extending out to about half the diameter of the runner, and the second extending from the outer extremity of the first set, and in lines tangential, or nearly so, to the diameter of the first, and a little curved, —the first set produce the upward, and the second the outward current. The runner has vertical apertures in its periphery parallel with, and between each set of beaters.

Claim.—"I wish it to be understood that I do not claim as my invention the taking air in at the centre below, and blowing it out through the cylinder and concave, as that has before been done, nor do I claim making an upward blast for the same reason; but what I do claim as my invention is the combination of fans substantially as set forth, so as to cause an upward and an outward blast in the manner described."

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19. For an improvement in the *Curry Comb;* Thomas Wilkinson, Cambridge, Washington county, New York, August 16.

The patentee says,—"The nature of my invention consists in the addition of a serrated semi-circular plate to the corner formed by the intersection of the top, and the right hand margin; and also a blade three-fourths of an inch in width on the back, extending from the aforesaid corner, on a line with the top, to its intersection with the left hand margin, designed as a scraper to remove any uncleanness; both to be made of the same metal of which the body is composed."

Claim.—"What I claim is combining with the common curry comb the serrated semi-circular plate, and the scraper, in the manner described."

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20. For an improvement in *Fire Engines;* Gardner Barton, Jr., Waterford, Saratoga county, New York, August 16.

This engine has two single acting cylinder pumps as usual, but instead of being permanent they are each connected at their lower end with a branch of the main pipe, by a cylindrical joint at right angles with the axis of the cylinder, the joint consisting of an arbor attached to the cylinder, and fitting in a corresponding cavity in the pipe, the two being provided with openings, or cavities, constituting the water-ways which are opened and closed by the vibrations of the cylinder. The upper ends of the piston rods are provided with a pin that slides in a groove made in a guide rod attached to, and vibrating with, the cylinders—the piston rods being also connected with the brake of the engine, by slides that can be moved along the arms of the brake, and secured at any point desired to regulate the capacity of the engine, for the farther these slides are removed from the axis of the brake, the greater will be the play of the piston, requiring, of course, an equivalent increase of power for working the engine.

Claim.—"What I claim is the combination and arrangement of the cylinders with the guides attached, and their agreement with the slides, by means of which the capacity of the engine may be enlarged, or diminished, at pleasure. I do not claim the invention of vibrating cylinders, but I do claim the invention of the application of the vibrating cylinders to the purposes of pumps for fire engines, in the manner herein before described. I also claim the opening in the upper ends of the guides on which the connecting pins act; and I claim the opening through the arbor, and the corresponding openings, (in the pipes) serving for water passages."

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21. For an improved mode of *Keeping Sweet Potatoes;* Aaron H. Vestal, Cambridge City, Wayne county, Indiana, August 16.

The patentee says,—"The nature of my invention and discovery consists in so regulating the temperature of the air in the room in which the potatoes are to be kept, as to prevent them from becoming chilled, or frozen, or from becoming too warm either by reason of the artificial heat produced in the room, or from becoming heated by too large quantities being packed together, so as not to admit a free access of air, either of which would prove destructive to the potatoe."

The potatoes are to be put into a box three or more feet square, and of any height desired, made of wood, three sides of which are boarded up in a reversed manner from that usually employed in boarding the sides of a framed house, the boards being kept apart by wedges; this admits a free circulation of air without permitting the escape of the sand in which the potatoes are packed. The front of this box is left open, the two sides being connected at top and bottom, for the reception of strips of boards to be slipped in, as the potatoes

are packed in, and the bottom, which is to be elevated a few inches from the floor, is composed of strips at right angles, one range above the other to form air passages. In packing the potatoes in sand, tubes, for the admission of air, are introduced here and there along the height of the pile.

Claim.—"What I claim is the box for keeping sweet potatoes, said box being constructed with ventilated sides and air tubes, the arrangement and construction of which is substantially as described."

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22. For an improvement in the *Cultivator;* William Dyzert, Gettysburg, Adams county, Pennsylvania, August 16.

This cultivator is for the working of corn, and consists in connecting two cultivators together, by means of two curved, or arch, pieces, to leave a space between the two of sufficient height to pass over the corn, and thus work it on both sides at the same time. The tongue to which the team is to be harnessed is attached to the upper part of the curved braces, or arch pieces.

Claim.—"What I claim is the curved iron braces which connect the two sides together, in combination with said sides and the tongue, constructed for the purpose, and arranged in the manner described."

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23. For a machine for *Turning Spools, or Bobbins;* Jonathan H. Cary, North New Salem, Franklin county, Massachusetts, August 21.

The piece of timber from which the spools are to be formed, is put into a hollow mandrel of considerable length, by which it is rotated. A sliding borer is applied in front for boring the hole, and at the same time a set of tools, attached to a sliding stock, are brought up, which turn the outer surface, and reduce the body, or that part which receives the thread, or yarn, and at the same time a circular saw, which is hung to the upper end of a vibrating beam, cuts it off from the stick. The movements of these various instruments are so regulated as not to interfere with one another.

Claim.—"I shall claim the machinery for sustaining the stick, and giving to it a cylindrical form, in combination with that for reducing the cylindric of the stick, so as to form the body (of the spool, or bobbin,) or part on which the thread is wound, with that for cutting off sections, or parts, of the stick of the length to form spools, or bobbins, and with that for drilling, or boring, the hole through the axis of the stick, or spools,—the whole arranged and operating substantially as set forth."

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24. For improvements in *Flouring Mills;* John Ansell, and James Gallery, Brooklyn, Kings county, New York, August 21.

The patentees make the following claim, viz:—

Claim.—"We claim as new, and of our own invention and discovery, and desire to secure by letters patent, the mode described of dressing the stones with the curved furrows, having the circle cut in

the reverse direction from those hitherto used, such furrows being widest and deepest near the eye, and the furrows of the runner being hollowing, or fluted, from the front, or feather edge, to the back, while those of the bed stone are cut in an angular form from the front to the back, in combination with the mode described of forming the eye of the runner conical, or bell-mouthed, below the upper part of the bail, when such mode of dressing and combination are employed with stones made and driven as described, and applied to any description of stones in which they may be equally available. Secondly, we claim, in like manner, the mode described of applying the action of a governor, similar to that used with the steam engine, to operate through the lever *l*, rod *m*, and cross lever *n*, to act on the runner, and feed when any variation occurs in the speed through any action of the lever *o*, slide 5, and rod 6, to raise, or lower, the shoe *p*, on its joint substantially as described."

To explain the references in the claim, we will remark that the slide of the governor is embraced by a fork on the end of the lever *l*, which has its fulcrum at the other end—at about one-third of its length from the fork it is jointed by a link to one end of a lever *o*, the other end of which is jointed to a rod 5, working in a slide, to which the shoe is jointed by a link 6.

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25. For an improvement in the *Key for fastening the Rails of rail-roads to their Chairs;* Benjamin Butterfield, Kensington, Philadelphia county, Pennsylvania, August 21.

This key is a dove-tail wedge with the thin end turned over to form a spring catch, which will close in driving the key in to fasten the rail to the chair, and after the spring has been driven beyond the side of the chair it flies out and forms a catch, to prevent the key from working out by the constant jar.

Claim.—"What I claim as my invention is the dove-tailed wedge, in combination with the spring hold-fast at one end of the wedge, to prevent its receding, or working out of the chair, and thus permanently securing the rails at their junction in the chair."

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26. For an improvement in the *Washing Machine;* David Kauffman, Mohecanville, Wayne county, Ohio, August 21.

This machine consists of a double series of rollers, arranged in two concentric circles, with sufficient space between the two series for the passage of the clothes to be washed, which are attached to, and carried around by a rod attached at each end to a wheel, the two wheels being rotated by appropriate cog-wheels. The gudgeons of the outer series of rollers slide in grooves so inclined as to cause them, by their weight, to press the clothes between the two series.

Claim.—"What I claim is arranging the double series of rollers in a circle in the manner described, and combining therewith the rod, or other suitable carrier, for taking the clothes round between the rollers in the manner and for the purpose specified."

27. For an improvement in the *Churn;* Thomas Ling, Portland, Cumberland county, Maine, August 21.

Within the cylindrical barrel of the churn there is another smaller cylinder of less height, and within the latter is a shaft which passes through the top to receive a crank handle, and from which a broad threaded screw, or other similar device, projects for the purpose of working the cream; holes are made near the bottom of the inner cylinder, and the upper end has a flanch inclining outwards.

The rotation of the screw produces a current of the cream through the holes at the bottom up the small cylinder, and down between the small and large cylinders—the butter, when forming, floating on the surface of the cream above the small cylinder.

Claim.—"What I claim is the combination of the large cylinder, the small cylinder with its perforations and flanch, and an apparatus for withdrawing the cream from the large cylinder, raising it in the small cylinder, and discharging it again into the larger one, not, however, confining myself to the screw for that purpose, but substituting any other contrivance by which the same result can be attained."

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28. For improvements in the machine for *Sawing Laths and Clapboards;* E. C. Gilman, Canaan, Grafton county, New Hampshire, August 23.

This patent is granted for two improvements on the machines generally used for this purpose, which consist of a circular saw and reciprocating carriage that carries the block of wood. The first improvement claimed is for an arrangement of parts for shifting the clutch from the cog-wheels that run the carriage up, to the band wheels by which it is run back. This consists of a sliding bar, operated by a pin, or projection, at each end of the carriage; the outer end of the bar is provided with two projections that embrace the end of a lever, and two springs attached to it, there being sufficient play between these projections for the end of the lever, which is to be cast from one side to the other alternately by the springs. A projection from the side of the lever fits alternately into two notches in the frame, and the bar, towards each projection, has an inclined piece which forces the lever out of these notches. The lower end of this lever is connected with the clutch, and the whole operates in the following manner:—Lowers the end of the forward motion of the carriage, the bar is drawn forward by it, and one of the projections draws up the spring which bears against it—at the same time the inclined piece disengages the lever from the notch, which leaves it free to be forced forward by the spring that has been drawn up—this shifts the clutch from the cog-wheel to the backing belt wheel by which the carriage is run back, and towards the end of this motion the same thing takes place to disengage the lever, and shift the clutch.

And the second improvement is for raising and dropping the back of the carriage to give the required bevel to the clapboard; the back rail on which the carriage runs, rests on three levers, the lower ends of which are connected together by a rod, and as this is drawn to one

side, or the other, the rail with the carriage on it is lifted, or let down. The shifting of the rod is effected by what is called a "set, or pointer," in the specification, so jointed to the under side of the carriage as to be moved by a wedge, which is shifted from one side to the other by the end of two levers that operate the rod by which the rail and carriage are lifted, &c.; as the carriage moves back, the set, or pointer, comes against the side of a wedge, which conducts it against one of the shifting levers—this lifts the rail and carriage at the end of the back motion, and at the same time shifts the wedge; and on the return of the carriage, the set, or pointer, passes over the top of the wedge, and when the carriage moves back again, the set, or pointer, is guided by the wedge to the other side, where the other lever is located, and by means of which the rail and carriage are let down. The butt end of the wedge is so formed that the motion of the levers shifts it.

Claim.—"I claim as my invention the combination of mechanism which acts in such manner as to connect the dog (clutch) alternately with the gear and the pulley, as described; and also claim as my invention, the combination of mechanism for elevating the side of the carriage, next the attendant, in such manner as to secure the proper degree of bevel for the stuff to be sawed, the same being effected by means of the three levers suspended by hinges, and the two upright antagonist levers (shifting levers,) and the connexion between them, and also the combination between these and the horizontal lever, (connecting rod) as described."

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29. For improvements in the *Printing Press;* Alonzo Gilman, Troy, Renssalaer county, New York, August 23.

This is for improvements in the vertical press used for printing cards; the first is for hanging the inking rollers to a working frame in such manner as to adapt them to the curvature of the cylinder that gives the ink, and to the face of the types. The rollers are hung in a working frame, the lower end of which is jointed to arms projecting from a rocking shaft operated by the same cam that works the toggle of the press. And the second is for adding to this kind of press a frisket for adapting it to the printing of sheets of paper instead of cards; this frisket is jointed to a sliding frame worked by a lever turning on the rocking shaft that operates the inking rollers, and it is closed by rollers that bear against its edges as it descends between the bed and platen of the press.

Claim.—"What I claim is the hanging the inking rollers in the manner above described, in the working frame provided for them, by means of which they are made conformable to the curve of the cylinder, and the face of the types, and so as to be adjustable thereto at discretion. I also claim the combination of a frisket with the said machine in the manner and for the purposes above described."

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30. For a machine for forming the *Knuckles of Butt Hinges* that

are manufactured of rolled iron, or other malleable metal; Cyrus Kenney, Troy, New York, August 23.

In this machine the knuckles of hinges are bent by two operations, the first of which gives them a semi-cylindrical form by means of two permanent dies placed at a distance apart from each other equal to the diameter of the semi-cylinder to be formed. The back one of these two dies has a flanch, or shoulder, against which the piece to be bent is pushed by the attendant, to gauge the bend. The metal is forced in between these dies, and bent by means of a third die attached to the end of a lever by which it is operated. The piece thus bent is then put into the other part of the machine, to undergo the second operation. It is laid on a bed die in the form of a rebate, with the back part of the hinge plate against a gauge plate, or die, and the turned edge resting on the lower part of the die; it is then acted upon by two other dies attached to, and moving with, a lever turning on a pin below, and actuated by a crank and connecting rod behind. By this arrangement one of the dies bears lightly on that part of the hinge plate which is uppermost, and the other is forced up against the bent part, and curls up the metal into a cylindrical form.

In the claim, the two permanent dies of the first operation are designated by the letters *b* and *c*, and the movable die by the letter I; and in the second operation the bed die is designated by the letter *e*, the gauge by the letter *f*, the movable die that bears on the top by the letter *h*, and the other by the letter *i*.

Claim.—"Having thus fully described the nature of my machine for bending the projecting pieces on the flaps of butt hinges, so as to form them into knuckles, and having also shown the manner in which the same operates, what I claim as new therein, and desire to secure by letters patent, is the so combining and arranging its parts in the manner set forth, as that the pieces to be bent shall first have one-half of the intended curvature given to them by dies, formed and actuated in the manner of those designated by I *b c*, and shall subsequently have the bending completed by means of a die, check piece, bed and gauge piece, such as are shown at *i h a* and *f*; the respective parts of the whole machine being arranged and actuated substantially as made known."

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31. For an improvement in *Scoop Excavators*, for removing mud from the bottoms of rivers, canals, &c.; Joseph Smith, Mansfield, Richland county, Ohio, August 24.

The sides, or ends, of this scoop are curved in the form of a sickle, and made sharp for the purpose of cutting roots, &c., and are provided each with a gudgeon which works in a frame, by which the whole is dragged. The bottom of the scoop is perforated to permit the water to pass through, and from the back two curved runners project, on which the scoop runs after it has been filled and turned sufficiently to hold the mud, &c. On the frame there are two lever catches that fit in holes in the sides of the scoop, for the purpose of retaining it in any desired position relatively to the frame; these two lever catches

are linked with two other levers, so arranged, with connecting rods along the handle, as to enable the attendants, by means of these and cords attached to the runners, to govern the position of the scoop.

Claim.—"What I claim as my invention, is the combination of the perforated scoop and runners with the levers, (the two sets) rods and apparatus for discharging the scoop, constructed and operated in the manner above set forth."

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32. For an improvement in the machine for *Cutting Match Splints;* Hervey Law, Wilmington, New Hanover county, North Carolina, August 28.

Match splints have heretofore and are now, in some instances, made by means of a steel tube sharpened at one end, and attached to a hand plane, the tube cutting a cylindrical rod the size of the hole. One of the improvements under this patent is for combining with this tube, or a series of them, a lip which tends more effectually to sever the rod from the block, and leaves the surface prepared for another cut. And the other improvement is for an arrangement of parts constituting a machine for making splints by means of such tubes attached to a slide, the block being fed up at the end of each operation, and held firmly by a wedge.

Claim.—What I claim as my invention, is combining with the tube cutters the flanch, or wing, for the purpose and in the manner described, whether the tubes are made in sets, or in single tubes; and also the combination of the movable lip with the follower, the wedge and tube cutters, in the manner and for the purpose set forth. And I do hereby declare that I do not intend, by the description given, to confine myself, in the second claim, to the precise shape, or form, or manner, of arranging and connecting the auxiliary parts of the feeding apparatus, or to the peculiar form, or arrangement, of the tube cutters, but to vary them as I may find expedient, whilst the general construction and operation of the feeding apparatus, is substantially the same with that set forth, and whilst it is made to retain those features which distinguish it from all other machines which have heretofore been constructed for the same purpose."

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33. For an improvement in the *Brick Press;* Jeffery Smedley, Columbia, Lancaster county, Pennsylvania, August 28.

This is for an improvement in the press for compressing, or repressing, bricks. The follower, or platen, of this press acts upwards—the lid of the mould when closed being the bed. To the slide of the follower there is an arm jointed, like one arm of a toggle joint, the lower end of which is caught by a cam on a cylinder, or shaft, below, so hollowed out as to form a seat for the end of the arm, and thus together act as a toggle joint in giving the pressure; on the return motion of the shaft (which is a rocking one,) another cam strikes against a curved arm (called in the claim a segmental cam) projecting from the arm of the follower just described, and forces the follower up higher to discharge the pressed brick, the lid having been lifted up

in the commencement of the back motion of the rocking shaft by a lever connected with a slide, actuated by a third cam on the rocking shaft.

Claim.—"What I claim as my invention, is the arrangement of the cams (first and second) upon the rocking shaft, in combination with the follower and the segmental cam, and in combination with the above I claim cam (third) and sliding rod for operating the lid, the whole arrangement and operation being substantially as described."

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34. For a machine for *Cutting and Gathering Corn, Sugar-Cane, &c.;* Jacob Peck, Oakland county, Tennessee, August 28.

The knife for cutting the stocks of corn, or sugar-cane, or other similar article, is attached to the side frame of a car; it projects from the side of the frame in a curved line, so that the frame shall support the cane whilst under the action of the knife. There is a vertical shaft with arms projecting therefrom on the frame and near the knife, and rotated by means of a bevel cog-wheel taking into cogs on the front driving wheels. The stocks are caught by these arms, and deposited on the platform of the car, there being appropriate guides for this purpose.

Claim.—"What I claim is the knife in combination with the revolving cross arms driven by the bevel cog-wheels, arranged and constructed as described; and also the arrangement of the knife and revolving cross arms, in combination with the car and guiding rod, as described."

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35. For a *Governor for regulating the movements of Mill Wheels, Steam Engines*, and other machinery; Henry Burt, Boston, Massachusetts, August 31.

Instead of the balls and arms thrown out by centrifugal force, or jointed wings opened by the resistance of the air, as the velocity of the machinery is increased, the present patentee employs a vertical shaft with spiral wings, (made in the manner of the screw propeller,) and so placed in a vessel filled with water, or other fluid, that the resistance of the fluid acting on the spiral vanes, or wings, by the increased motion of the machinery, causes the shaft and vanes to rise, and when the velocity is diminished, and the resistance thereby reduced below the gravitating force of the weight of the shaft and wings, or vanes, it descends, and by its connexion with the throttle valve of an engine, gate of a mill, &c., the moving force of the machinery is either increased, or diminished.

Claim.—"Having thus explained my invention, I shall claim the employment, as a governor, of a screw, or other analogous contrivance, as described, to revolve in water, or other fluid, and act therein, and in all respects substantially as set forth."

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36. For a machine for *Cutting Sausage Meat;* Edwin Clark, Hartford, Connecticut, August 31.

This machine resembles that kind of straw cutters in which the cutters are attached to the face of a wheel, or the arms of a fly-wheel. The forward end of the trough is provided with two series of knives, one horizontal, and the other vertical, forming apertures, or meshes, through which the meat is forced by a piston, or follower, into long pieces, which are again cut by the rotating knives as they pass out.

Claim.—"What I claim is the combination of the revolving and parallel knives, and in combination therewith the piston for forcing the meat through the parallel knives."

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37. For an improvement in the method of making *Patterns for Casting Hollow Ware,* and other articles of metal, in which the inner and outer patterns are required to be of a corresponding figure; Ezra Ripley, Troy, Rensselaer county, New York, August 31.

Instead of making, or carving, an inner and an outer pattern of the form required to cast any desired article between, one of the patterns only is made, say, for instance, the inner one, and from this a casting is made which is to answer the purpose of the inner pattern. After this the first made pattern is coated over with paint, and then a coating of sand, and then again paint and sand, and so on until the desired thickness of the casting is attained, and from this a casting is to be made to answer the purpose of the outer pattern, or mould. This mode of obtaining the outer from the inner, or the inner from the outer, pattern, enables the operator to obtain the corresponding figure without any difficulty. Any kind of mastic can be substituted for the paint and sand.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the mode, or manner, in which I obtain iron, or other metallic, castings, or second patterns, of nearly uniform thickness, by means of spreading any suitable material, or composition, on the face of the aforesaid plaster cast in thickness equal to the thickness of the iron, or other metallic, castings, or second patterns, afterwards to be obtained, and the principle involved in such mode of proceeding."

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38. For a *Hydro-Pneumatic Apparatus* for raising beer from casks, &c.; Richard Sealey, New York City, August 31.

From a reservoir of water placed at any desirable height, a pipe provided with regulating cocks, descends and opens into another vessel, and near the bottom thereof, and from near the top of this another pipe descends into and near the bottom of an air vessel. In the claim the first of these vessels is indicated by the letter A, the second by the letter B, and the air vessel by the letter C. The air vessel C, is provided with a draw-off cock placed a little above the lower end of the last mentioned pipe, so that the water into which the end of the pipe dips, may be drawn off when too great a quantity has accumulated without suffering it to descend below the end of the pipe. The upper part of the air chamber is separated from the lower by a double acting valve, which closes upwards and downwards, and below this is a float, which, when forced up, closes the valve. From

the upper of these chambers a pipe extends to one or more casks, which are also provided with pipes which extend to the apartment, or place, where the liquor is to be discharged. The vessels A and B are provided with pipes and cocks connecting them with a pump, &c., by which they can be supplied with water, or air, as required.

When water is permitted to descend from the reservoir A, into the vessel B, the air is forced up, and passes down the pipe into the air vessel, and from thence into the casks; but should the water in vessel B, rise high enough to pass down into the vessel C, and there accumulate, it cannot enter the casks, for the float will be forced up and close the valve.

Claim.—"I am aware that the conjoint action of water and air has been used for the purpose of raising liquids, but I am not aware that any similar arrangement has been applied to the two-fold purpose of raising the fermented, or other, liquors, from the cask to the place where it may be drawn for use, and at the same time avail of the pressure of the air on the surface of the liquor in the casks to preserve the liquor itself; and I am aware that I cannot claim to be the inventor of any of the parts employed taken separately, as each is already well known; therefore, I only claim as new the application of the arrangement and combination of the vessels A B and C, with the pipes, cocks, and valves, as described, when such application, arrangement, and combination are employed for the two-fold purpose of raising fermented, or other liquor, from the casks, to the place where it may be drawn for use, and of preserving the liquor itself, by maintaining a considerable atmospheric pressure on the surface of the liquor within the cask, substantially as described."

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*Patents Re-issued for Amendments in the month of August*, 1844.

1. For improvements in the *Locks of Pistols*, and other fire arms; Ethan Allen, Norwich, Worcester county, Massachusetts, August 3.

This patent was originally granted on the 11th of November, 1837, and reissued on the 15th of January, 1844, and, therefore, the reader is referred to the notices heretofore given in this Journal, for a description of the general characteristics of the improvements, the present reissue having been obtained for an amendment of the claim simply.

Claim.—"I claim a mechanism for elevating the cock from the nipple by a simple pull of the trigger in combination with a mechanism which so separates certain parts during, and by, said pull of the trigger, as to permit the cock to be thrown down upon the nipple, by the reaction of the main spring, all as set forth; and a mechanism that, by the said pull of the trigger, has a power generated within it, which, on the release of the retractile force, or finger, from the trigger, shall immediately reannex the disconnected parts or restore them to their requisite positions for the accomplishment of another discharge by another pull of the trigger, as explained; the whole being arranged and operating substantially as hereinbefore specified."

2. For an improvement in the *Press for Packing Cotton*, and for other purposes; S. W. Bullock, Williamsburgh, New York, August 11.

This patent was originally granted on the 23d of March, 1842, and as it is one of those not yet noticed in this Journal, we will here give the claims under the original as well as the reissued patent.

The follower is operated by means of a segment cog-wheel and pinion, the centre of the former being connected with the shaft of the latter by bridles, or stirrups. The cog-wheel is also connected with the under part of the follower by a gudgeon, so that the semi-diameter of the segment wheel from the centre to its connexion with the follower constitutes one arm, and the bridles connecting the centre of the segment wheel with the shaft of the pinion, the other arm of a toggle joint,—the pinion and its shaft being in a vertical line below the connexion of the segment wheel and follower.

Claim.—"What I claim as new is the manner in which I have combined the follower and the segment wheel with the pinion and its shaft, the axis of the segment wheel, and the shaft being connected by bridles in the manner set forth, and the follower being sustained and operated on by the segment wheel through the intermedium of a gudgeon, or other analogous device, on the under side of said follower, the respective parts being combined and operating substantially in the manner set forth."

Claim under the new patent.—"What I claim is the manner in which I have constructed the press by the combination of the segment wheel with the pinion and its shaft, the axis, or fulcrum, of the segment being at the jointed part of the arms, or other analogous devices, that will allow of the axis, or fulcrum, moving from an acute angle to a straight line with the point on which the arms rest, and the line on which the gudgeon moves, and vice versa; in other words, I claim the invention, or discovery, of moving the axis, or fulcrum, of a wheel, or lever, in the simple act of operation of said lever, or wheel, the axis, or fulcrum, of which is at the movable joint, (the connexion of the bridles and axis of the segment wheel,) so as to produce a direct force against the object to be moved—with all the advantages of the progressive power of the toggle joint operated by an extended lever—the whole being combined and operating substantially in the manner set forth."

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*Patents for Designs which issued in the month of August*, 1844, *under the third section of the Act of August* 29, 1842.

For a *Medallion Portrait Bust of Theodore Frelinghuysen, in Mezzo-relief;* Salathiel Ellis, assigned to John G. Wellstood, New York City, August 12.

*List of American Patents which issued in the month of November*, 1841, *with Remarks and Exemplifications.* By CHARLES M. KELLER, Examiner of Patents.

1. For improvements in the *Saw Mill* for resawing boards and other lumber; Pearson Crosby, Freedonia, Chautauque county, New York, November 3.

The object of these improvements, as expressed in the title, is for resawing, or slitting, boards of any thickness, and of any irregularity, and as the claim refers to, and is wholly dependent on, the drawings, we will be under the necessity of omitting them; they are confined, first, to an arrangement of vertical rollers which sustain and present the board to the saw; one set of these are feed rollers, geared to the machinery, and operated by the ratchet wheel, and the board is held and pressed against them by another set suspended to appropriately arranged levers, which bear them up, and admit of their yielding to any irregularity in the thickness of the board; second, to the arrangement of these rollers in sections and connecting the axles of the different sections by joints to slit the boards diagonally, so that two clap-boards may be cut from one board, the jointed parts of the axles of the feed rollers being connected with slides governed by screws to adjust their position, and the joints of the pressure rollers free to adapt themselves to the position given to the feed rollers; third, to an arrangement and combination of the parts for working the feeding apparatus. And finally, to an improvement in the mode of straining the saw, by means of three stirrups at each end instead of one, the main stirrup being attached in the usual manner to the gate, and the other two jointed to the first—one being attached to the front, and the other to the back edge of the saw.

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2. For *Safety Boxes for Railroad Axles;* Peter and William C. Allison, Philadelphia, Pennsylvania, November 3.

This is for the purpose of giving additional strength to the parts of the axle inside of the wheels where they are most liable to break, and consists of divided boxes made in two parts, with flanches at the end and sides, the former to secure them by screw bolts, &c., to the wheels, and the latter to bolt the two halves together, embracing the axle which is grooved in the direction of the circumference to receive fillets on the inside of the boxes.

Claim.—"What I claim as my invention, and desire to secure by letters patent, is the construction and arrangement of the safety boxes on the axles of the car wheels, having tongues (fillets) inside said boxes, fitting into corresponding grooves in the peripheries of the axles in the manner and for the purpose set forth, and rods, or hooks, with screw nuts for securing the safety boxes to the car wheels, as above described, or whether constructed in any other manner substantially the same, and for a similar purpose."

3. For an improvement in the *Steam Engine;* Joseph Frost, Brooklyn, New York, November 3.

The patentee says,—"I denominate my improved engine the reciprocating expansion engine, and I so denominate it because I use the same steam expansively in two, three, or more, cylinders in succession, each of larger capacity than that which precedes it. The first, or smallest, cylinder is to receive its supply of steam directly from the boiler, or generator, which is constructed and heated in the ordinary way. Along side of this boiler I place steam receivers, or reservoirs, which I usually make cylindrical, and of the same length with the boiler; these I make capacious, say of half the diameter of the boiler, more or less; they are intended to receive the steam after it has acted in one cylinder on its way to that in which it is next to operate. These steam receivers I keep heated by causing the gaseous products of combustion to pass through flues below them, on their way to the chimney, instead of allowing them to pass directly thereto; the heat, therefore, which otherwise would be wasted, I employ to heat these receivers, and thus preserve and increase the elasticity of the steam during its passage from one cylinder to another. As the heat thus communicated to these steam receivers, will, in general, be sufficient not only to preserve the elasticity of the steam, but also, as above indicated, to augment it, I cause them to receive a small supply of water, which may be evaporated by this excess of heat, and thus operate in increasing the power of the engine without increasing the consumption of fuel."

Claim.—"What I claim as my invention, is the use, in combination of two, three, or more, steam cylinders in which the same steam is to be used expansively, its supply being cut off at any preferred part of the stroke, and the successive cylinders being of increased capacity, as set forth, and in combination with said cylinders, and as making a part of my particular arrangement I claim the employment of the steam receivers, intermediate between the respective cylinders; said receivers being heated by the heated air from the furnace in its passage to the chimney; the whole being combined, arranged, and operating substantially as described. I do not claim any of the component parts of this apparatus taken individually, nor do I claim the right of using the same steam in two or more cylinders successively, that having been done by James Watt, and by others; nor do I claim the exclusive right of using steam in an engine with double cylinders of unequal dimensions, where the steam is used expansively in the larger cylinder, while the steam reacts with a great and variable force against the piston of the smaller cylinder propelled by unexpanded high steam, this having been done and is still done in Woolf's engine."

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4. For an improvement in *Air-Tight Stoves;* Joseph E. Fisk, Salem, Essex county, Massachusetts, November 3.

Claim.—"I shall claim arranging the fire pot in the fire chamber of an air-tight stove, in the manner described, so that the smoke and heated products of combustion, after being conducted through the

several chambers and pipes, as specified, and imparting heat to the room, are again brought into direct contact with the burning fuel by passing between said fire pot and chamber to the surface of the fuel in the fire pot, when such parts as are capable of further combustion, are more effectually consumed, and then again circulated as before, the whole arrangement and operation being substantially as set forth."

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5. For an improvement in *Shears for Cutting Metals;* William Bulkley, and Otis M. Inman, Berlin, Hartford county, Connecticut, November 3.

This is for an improvement in shears used by workers in tin plate ware, for cutting circular plates of sheet metals. The shears are, as now generally used, composed of two rotating plates, the sharpened edges of which act together in performing the cutting operation, and have their bearings in studs connected with an open elliptical frame, (incorrectly called in the claim a "bow,") by slides and set screws for adjustment to each other, and to the cutting of plates of different diameters. This frame, or bow, turns on the gudgeons, or bearings, of the clamp plates in which the sheets of metal are secured, so that it can turn thereon, and carry the shears around to cut the circle.

Claim.—"We do not claim as our invention the bow, or frame, or its application to the arbor, nor do we claim the attachment of the shears, so as to carry them around the arbor, as these have all been known before; but what we do claim as our invention, is attaching the studs, in which the shears work, to the bow, or frame, which receives the gudgeons, or bearings, of the arbor, and which travels around on it substantially in the manner described."

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6. For an improvement in the mode of rendering *Fabrics Water-Proof;* Thomas B. Rogers, New York City, November 3.

The following is the specification, viz.,—My improvement consists in rendering cloth water-proof by saturating it with a material which is insoluble in water, but which admits of the free passage of air through its fibres—a feature in which it differs from fabrics rendered water-proof by means of caoutchouc and similar articles. The following is a description of the process which I employ:—

"In a vat of a suitable size I form a solution of sulphate of soda, or glauber salts, generally in the proportion of three quarters of a pound of the salts to a gallon of water, and in this I immerse the cloth; when it has become fully saturated, I convey it to another vat containing a solution of acetate, or sugar of lead, and permit it to remain there a sufficient time to enable a chemical reaction to take place between the solution of sulphate of soda with which the cloth was saturated before entering the second vat, and the solution of acetate of lead in this vat. The effect of this reaction is to make a soluble acetate of soda, and an insoluble acetate of lead—the former of which is dissolved in the vats, while the latter is precipitated among the fibres of the cloth, and forms the principal means by which I render

the cloth water-proof. After taking the cloth out of this last vat I immerse it in another containing a solution of sulphuric acid in the proportion of about sixteen drops to the gallon of water, for the purpose of rendering the lead in the fibres of the cloth a perfect sulphate. The cloth I afterwards pass through a solution of camphor in water, but which is not necessary to my invention, for the purpose of removing the unpleasant odour arising from the use of the acetate of lead. After which it is scoured with warm water and soap to remove the excess of acid, and any of the materials, or ingredients, referred to, that may remain on its surface. I have mentioned sulphate of soda as one of the articles used in this process; this I employ only for the purpose of decomposing the sugar of lead as stated, and as there are several other sulphates which will produce the same effect, I do not intend to limit myself to the use of this, but to employ any of the others should I find it expedient to do so.

"What I claim as my invention, therefore, and desire to secure by letters patent, is the mode of rendering fabrics water-proof by passing them through successive solutions of sulphate of soda, or its equivalent, acetate of lead, and sulphuric acid, as herein set forth."

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7. For an improvement in *Bedsteads;* John P. Allen, Manchester, Essex county, Massachusetts, November 3.

On each end of the rails there is a left handed screw cut next to the shoulder which receives a nut, and beyond this a right handed screw of less diameter, which screws into the post, there being sufficient space left between the face of the post and the shoulder on the rail for the nut to be turned up, by means of a small winch, or lever, against the face of the post to render the joint tight. By loosening the nut, the rail, or beam, can be turned at any time to tighten the sacking, after which the nut can be screwed up and the joints made firm.

Claim.—"What I claim is the method described of making the joints of bedsteads firm and tight, and giving sufficient play to the screws on the ends of the rails for tightening the sacking by means of the nuts in combination with the rails and right and left handed screw on the ends of the rails, as described."

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8. For improvements in *Saw Mills;* Frederick Goodell and Thomas W. Harvey, New York City, November 3.

The claim refers throughout to, and is wholly dependent on, the drawings, which we are therefore under the necessity of omitting. The first claim is limited to the arrangement of the gearing which operates the crank shaft and the feeding motion of the carriage, (which is continuous,) these two motions being connected by a set of cone pulleys, that the feeding may be changed and regulated during the operation of the mill. The second is to the arrangement for setting the log in which the screws, that move the slides, on which the log rests, on the head and tail blocks, are connected together by a cord passing over a pulley on each screw shaft, (and giving motion to it by a ratchet,) and

the ends attached to a longitudinal slide on one of the rails of the carriage, which slide, at each motion of the carriage, is moved by appropriate fixtures attached to the floor of the mill. The third is for the manner of trussing the upper and lower ends of the saw frame, or gate, by means of arch pieces abutting against notches in the ends of the cross, or tie, pieces, with wedges between the two, and the whole embraced by the stirrups; the object of which arrangement is to give the requisite strength to resist the strain of the saw with less weight than heretofore. And the fourth is for "feeding the stuff to the saw by means of a continuous motion, in combination with a reciprocating saw having sufficient rake to clear itself in raising, so as to admit of such continuous motion of the carriage."

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9. For a machine for *Cutting Stone;* Thomas J. Cornell, Worcester, Massachusetts, November 3.

In this machine the stone is to be cut by means of cutters projecting radially from a wheel, and sliding in radial grooves therein; the operation, therefore, is very similar to a circular saw, except that the cutters rotate slowly. The cutters are moved out as fast as they wear, by means of pinions on screw shafts parallel with the cutters, there being a nut on each screw that actuates the cutter. The nuts are turned at each revolution of the cutter wheel by taking into a segment so connected with a set of levers that the cutters are only advanced as fast as the cutters wear away.

Claim.—"What I claim as my invention, is the mode of adjusting the tools to one and the same length, from the edge of the wheel, however much, or little, they may wear off in cutting the stone, by means of the operation of the regulators acting upon the pinions to turn the screws, and to move the nuts, as is fully set forth and described in the specification."

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10. For an improvement in the *Action of Piano Fortes*, for modifying the tone; Daniel B. Newhall, Boston, Massachusetts, November 3.

Claim.—"What I claim as my invention, is the mode of varying the points at which the force is applied to the hammer, so as to produce at pleasure a piano, or pianissimo, tone by means either of an under hammer rail, and hammer made movable, as described, and operated substantially as set forth; or by making the cheeks movable instead of the hammer rail, and operating them in the same manner, so as to produce a similar effect."

This rail is simply made to slide by connecting it with a pedal, so as to place it entirely under the control of the performer, to increase and decrease the leverage of the hammers.

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11. For an improvement in the *Cocoonery for Feeding Silk Worms;* J. B. Tillinghast, Norwalk, Huron county, Ohio, November 10.

The patentee says,—"In the feeding of silk worms the greatest dif-

ficulty and labor occur in the last stage of this operation—that is to say, after the fourth moulting—and it is to this stage of the business only that my improvement applies. In the old way of feeding worms upon shelves, or hurdles, at a period when so much food is required as in this last stage, and when it is necessary to be especially careful to keep them well supplied with food, and perfectly clean, in order to insure their remaining in a healthy state, so many difficulties have been encountered as to cause the abandonment of the business by numbers who had engaged in it, and to render it manifest that without some great improvement it could not be carried on in a country where hand labor is attended with the expense incident to our situation in the United States. It must be admitted also, that the more nearly we can allow the worm to operate according to its natural instincts, the more likely we shall be to succeed in deriving profit from its products. Under the guidance of the experience, and of the reasoning above noticed, I have so constructed a part of my cocoonery as to admit of the worms being fed upon whole trees, or upon the large branches of trees, and upon these also they are allowed to spin their cocoons. I feed my worms as formerly upon shelves, until they revive from their fourth moulting, when I remove them to an apartment constructed for the special purpose above indicated."

Claim.—"What I claim is the manner of constructing my frames in the cocoon room by suspending them from the rafters, and so that the shelves from the feeding room can be readily attached to, and removed from, their under side, and that the trees, or large branches, which are to supply the last portion of their food, and constitute a lodgment for the cocoons, may be sustained upon strips of wood for the purpose and in the manner set forth; and I claim the so making and using of the structure, or apparatus, for the purpose and in the manner aforesaid."

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12. For an improvement in the mode of *Bating Hides in the process of Tanning;* Simeon Guildford, borough and county of Lebanon, Pennsylvania, November 10.

This improvement consists in using the sulphate of alumine, common alum, in solution with water, for the purpose of extracting the lime and saponaceous matter with which the hides are saturated; the acid of the alum unites with the lime, and the astringent properties of the alum, adds to the cohesion and strength of the hides as they come out of the lime, and at the same time distends and thickens them, and causes them more readily to imbibe the tannin of the bark, of which something less is required in consequence of the use of the alum bating liquor.

Claim.—"What I claim as my improvement in the art of tanning is the use of alum in the process of tanning with bark, and for the purpose of bating the hides as specified."

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13. For an improvement in the *Stop Motion for Power Looms;* O.

M. Stillman, Stonington, New London county, Connecticut, November 10.

A plate is attached to the breast beam under the cloth, and extending towards the reed, in which there is a slide armed at the end towards the reed with small vertical pins, which are woven into the cloth when the filling does not fail, and by which the slide is held back until the harness changes, at which time it is liberated and forced towards the reed preparatory to another operation. This holding of the slide back by weaving in the pins, holds up a hinged hook, but when the filling fails the slide moves back with the reed, and permits this hook to be caught by another hook on the lay, and the former being in connexion with the shipper, the loom is thrown out of gear, and stopped.

Claim.—"What I claim as my invention is the employment of the teeth attached to the slide, for the purpose of stopping the loom when not woven in, as specified."

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14. For an improvement in *Bridges;* Albert Cottrell, Newport, Rhode Island, November 10.

This improvement consists in supporting the bridge during the process of construction, as well as after completion, by the application of a counter-balancing power, which consists of stone laid upon a part of each end of the bridge, projecting in rear of its abutment, thus preventing a depression, or sag, of the bridge, as is the case with all wooden structures of this kind, and at the same time giving to the bridge the appearance of a very flat segment, or arch.

Claim.—"I shall claim projecting a bridge over a river without the aid of centering, staging, or supports, as required by ordinary bridges, by the application of stone, or other suitable counter-balancing material, on the top of a portion of the same, and in rear of the front wall of one abutment, thus supporting and securing the bridge on the abutment, as its parts are progressively combined together, and built over the stream towards the opposite side thereof. Also preventing the bridge from sagging in the centre, and giving a flat curve to the same, by loading both ends thereof with stone, the whole process being substantially as described."

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15. For improvements in the *Cooking Stove;* Almond D. Fisk, assigned to Nelson W. Fisk, New York City, November 10.

Claim.—"What I claim is, first, the manner of arranging and combining the lift-out pieces, by which the boiler holes are formed, so as to admit of their being so arranged that a long boiler may be placed in four different situations, by the proper disposition of the said lift-out pieces, in the manner and for the purpose set forth. Secondly, I claim the particular manner described of constructing the hinged feeder for the supplying of coals to the fire grate. Thirdly, I claim the particular manner in which I have formed the heated air chamber under the fire chamber, between the back plate of said fire chamber,

and the front plate of the oven, and in part under the oven, into which air chamber the gaseous products of combustion pass through the descending flues, on their way to the centre ascending flue; the respective parts named being combined with each other substantially as described. I do not claim the arranging two descending and one ascending flue in the rear of the oven, as of my invention, such flues having been before used; but I limit my claim to the combination of them with the heated air chamber in the particular manner and for the purpose made known."

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16. For an improvement in the construction of *Vessels with Air-Tight Trunks*, to prevent them from sinking; Richard McDonald, Harrisburg, Dauphin county, Pennsylvania, November 10.

The nature of the alleged improvement is fully expressed in the following—

Claim.—"What I claim as my invention, and desire to secure by letters patent, is enclosing the spaces under the wheel guards of the boat, and filling them with air chambers, in combination with the arrangement of air chambers over the keelson, and under the deck, to prevent them from sinking when snagged, or otherwise injured, as described."

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17. For a *Corn Sheller;* Joseph H. Derby, Leominster, Worcester county, Massachusetts, November 10.

The corn in this machine is shelled by being forced through a sheller by means of a piston worked up and down by a treadle; the sheller is made of several flat pieces of steel brought to a point at one end, and set in a circle with the pointed ends up, a little inclining to the centre, around a hole made in a thick piece of board, left thicker where the hole is, and thinner round the edges. The sheath is placed between the sheller and the piston when up, and is for the purpose of receiving the ears of corn one at a time, and guiding them whilst under the action of the piston, which forces the cob through the sheller, the points of which strip the grains that fall into a box surrounding the sheller.

Claim.—"I claim as my invention the combination of the piston with the sheath and sheller, constructed and arranged in the manner set forth."

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18. For improvements in the *Air-Pump;* Joseph Milnor Wightman, Boston, Massachusetts, November 10.

The piston of this air-pump is connected with the plate by means of a hollow stem, or piston rod, and the upper end of the movable cylinder is provided with an air-tight cap, or cover, and stuffing-box, the cover, or cap, being provided with a valve opening upwards. Instead of attaching the piston rod, or stem, directly to the pump plate, a reservoir, called a "safety box," is placed between the two to receive and hold water, or any other substance, which may run

down from the receiver. The upper end of the stem is covered with an inverted cup, and the holes for the passage of the air into the hollow stem are made directly under this cup.

Claim.—"I disclaim all right, or title, to the combination of a simple lever, movable barrel, fixed piston, &c., constituting a single barrel table air-pump, provided the barrel is open, and the top of the piston exposed to the open air. I also disclaim all right, or title, to the tight cover, packing box and piston, as described, if applied to, or combined with, fixed barrels and movable piston, whether operated by means of a simple lever, or otherwise; But what I claim as my invention, and desire to secure by letters patent, is, first, the combination of a tight cover, packing box, valve and piston, as described, with the top of the barrels of all air-pumps, so constructed that the barrel is moved upon a fixed piston combined by a hollow rod with a receiver, and by means of a simple lever, or other convenient power, and in which the operation is such that the act of exhausting the receiver presses the pump down upon the table, stand, or floor, upon which it is placed without regard to the particular form, or size, of the pump. Second, for the application of a safety box, as described, placed between the pump plate and the barrel of all air pumps with either fixed, or movable barrels."

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19. For an improvement in *Platform Balances;* Thomas Y. Jennings, Geneva, Ashtabula county, Ohio, November 10.

Claim.—"What I claim as my invention is the method of combining the two levers so as to lessen the friction at the points where they come in contact, by employing a roller in a cup, or concavity, on the surface of the long lever, upon which the lip, or extremity, of the short lever closes in such a manner as to work easily upon it, at the same time preventing, by the peculiarity of its construction, the escape of the roller, all as set forth."

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20. For a machine for *Slitting Timber*, in making laths, splints for baskets, chair bottoms, &c.; Benjamin Beach, Clarksville, Clinton county, Ohio, November 10.

The timber to be slitted is put upon an appropriate horizontal frame, on which slides a carriage adapted to the reception of two, or more gates, or frames, containing the knives, to one of which is attached a number of lancet formed cutters, placed at distances apart equal to the width of the splints to be cut, and to the other the knife for separating these from the block, which last mentioned knife is attached to a rocking shaft that it may adapt itself to the direction of the grain of the wood; the dividing knives, of course, precede the separating knife.

Claim.—"What I claim is the attaching of the knife, or knives, by which the stuff is to be cut into splints, laths, or slabs, of greater width, for various purposes, upon a vibrating, or rotating, stock, crossing a frame which slides vertically, so that said knife shall adapt itself unobstructedly to the varying direction of the grain of the tim-

ber in the manner described; I claim also, in combination therewith, the manner of employing the additional gate, or gates, furnished with cutting gauges, or knives, by which the splints, or strips, may be reduced to a determinate and regular width, as set forth."

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21. For an improvement in the *Graduator for Measuring and Drafting Garments;* Lewis Flenner, Philadelphia, Pennsylvania, November 10.

The following claim will be sufficient to enable those who are acquainted with the art of drafting coats, to understand fully the improvement, viz:—

Claim.—"What I claim is constructing one arm of the graduator with a diagonal edge on its inner side, diagonal divisions on said leg, the other arm, or leg, being graduated in the manner set forth; also the employment of said graduator, so constructed, in combination with the shoulder and centre measures, for drafting garments, the same being applied and operating in the manner described."

The graduator to which this improvement is applied, is a graduated square well known to the craft.

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22. For an improvement in the *Molasses Gate;* Levi Lincoln, Hartford, Connecticut, November 10.

The gate, or valve, instead of sliding, as heretofore, turns on a pin on an arm projecting from the side of the screw tube, and the handle by which it is moved, slides between two plates—the outer plate and the pin on which the gate turns being provided with set screws to keep the gate tight against the end of the screw tube, and thus prevent leakage.

Claim.—"What I claim as my invention is the combination of the lever (the gate) with the segment (the two plates between which the handle of the gate slides,) adjustable by the screws, as set forth."

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23. For an improvement in the *Churn;* Thomas Pierce, Hartwick, Otsego county, New York, November 10.

The bottom of the box of this churn is semi-cylindrical, and the upper part square; and the beater, or dasher, is composed of four arms projecting from each end of a shaft, with their faces at an angle of about 45 degrees with the line of the shaft, the inclination at each end being reversed for the purpose of throwing the cream towards the middle of the churn. These arms are connected by means of staves in eccentric curves to direct the cream towards the shaft.

Claim.—"What I claim is the bevel of the arms in combination with the barrel form of the buckets to give the centripetal operation upon the cream.

**To be Continued.**

## BIBLIOGRAPHICAL NOTICE.

*An Elementary Treatise on Mineralogy, comprising an Introduction to the Science. By* WILLIAM PHILLIPS, F.L.S., &c.; *Fifth Edition, from the Fourth London Edition. By* ROBERT ALLAN; *containing the latest discoveries in American and Foreign Mineralogy: with numerous additions to the Introduction. By* FRANCIS ALGER, member of the American Academy of Arts and Sciences, &c., &c.: Boston, William D. Ticknor & Co., 1844. pp. 662.

This work, published in Boston the last year, is compiled in part from the fourth London edition of the standard work of William Phillips. The last English edition, edited by Robert Allan, Esq., six years since, sustains the high reputation the original treatise has always held, among scientific men abroad, as well as the few in this country who were familiar with it, it has been considered the most valuable publication on mineralogy. To adapt it to the use of the American reader, it was necessary to add largely to the localities cited, as also to introduce the numerous new species, with their analyses, and forms of crystals. Fortunately this work fell into good hands, for the American editor, Francis Alger, Esq., of Boston, has devoted many years to the pursuit of general science, and more especially to mineralogy and geology, and has enjoyed the best opportunities that extensive personal observation, a valuable cabinet, and a wide scientific correspondence could afford. As the additions he has introduced make up about one half the number of pages, it might with propriety, we imagine, have been published as an original work, based on Allan's late edition: and as Mr. Alger has now so successfully entered the field as an author, we hope that in his next appearance he will assume a more independent title-page. But if we are disposed to find fault with Mr. Alger's modesty in this respect, we would highly commend it and his good taste too, in that instead of adopting the present common course with scientific writers of seeking to make out an original treatise, with its novel and cumbrous new system, burdened with strange and hard names, whose existence is fated to be as ephemeral as the systems to which they belong, he has been contented to follow that order of arrangement which common consent among scientific men generally acknowledges to be the best, and has given us the classification of minerals based on their chemical constituents. A perfect system of classifying minerals has not, it is admitted by all, been attained, and therefore we consider ourselves, who go not very deep into the niceties of these matters, to be rather more safe in following authority the most generally admitted, to selecting one of the less understood novel systems; and this conclusion appears to be substantiated by the immediate reception of this work as a text book in colleges and schools, particularly in Harvard University, and also by the high encomiums passed upon it by disinterested judges.

After all it is not the mode of arranging species that strikes us as the great important point to be attained to complete their description,

though such seems to be the principal aim of the science of this day. For ourselves, we look upon the great object of these scientific text books to be of a more *practical* character, not merely to please the deeply initiated by the exact and critical relations of species with one another, but to give to the tyro, or the man of business, who refers to them, the most ready information as to the nature and uses of the different minerals. His eye, as it turns to the head of each page in this work, meets the intelligible terms "*Earthy Minerals*," "*Metalliferous Minerals*," etc., and he understands at once the general nature of the species beneath. And in the "*Table of Mineral Species*," he finds their atomic composition, their hardness, and specific gravity expressed in the simplest forms. But with regard to this table, we cannot help suggesting what would be for us a great advantage in searching out the name of unknown specimens, and this is to adopt a similar arrangement to that found in some other works, placing the species of each class in an order corresponding to their hardness, or to their specific gravity, that we might be led at once to limit their place within a narrow range; and if the color of the streak, and action before the blowpipe, and with acids, etc., could be brought into the same tabular arrangement, we are confident the work would be sought for in preference to others that are now referred to for the sake of similar tables, though in other respects they contain much to excite a distaste to the whole subject.

But a few words more concerning the arrangement adopted in this work. As minerals vary by insensible graduations, one atom, and another of one or more of their constituents being replaced by other elements, it is most unlikely that all could ever agree as to their proper places in any system. Their very nature seems to render an universally received mode of arrangement out of the question. Logicians may more easily resolve the long mooted question of the pair of hose, that were so repeatedly darned as to lose all their original threads—whether these remained the identical pair purchased by their owner, and if not, when they ceased to be so—as mineralogists to agree in their classification. In this science, however, there appears to be one advantage that does not extend to the hose, namely, that the threads, or elements, being united in certain definite proportions, or atoms, if so much of one of them is replaced by another as amounts to one of these atoms, the compound is considered as having assumed a new character, and is thus entitled to a new place and name; but when the replacement is too minute to be so estimated, the change is very properly considered by Mr. Alger accidental, and is not regarded. For example, condrodite, or broncite, contains sometimes two per cent. of potash, but this never amounting to an atom, it remains classed with the earthy minerals, while the feldspars, always containing an atom or more of potash, or soda, belong to the alkalino-earthy minerals.

The formulæ representing the atomic constitution of the minerals are determined by the equivalents of their elements, as given by Thomson. These atomic weights differ little in their relative proportions from those of Berzelius, Thomson's being calculated from oxygen

reckoned as one, and Berzelius' tables from oxygen reckoned as one hundred. Those of the former are all simple multiples of the atomic weight of hydrogen, the original views of Prout in this particular being sustained, as we are informed in a note, by the farther investigation of Dumas, Marchand, and Erdmann. By dividing the per centage results of each constituent obtained by analysis by the combining proportion of oxygen with the same substance, numbers are obtained which indicate the atoms of the different constituents of the mineral examined. The same result is also attained by dividing each by its atomic weight as given in the tables; and this latter is the method adopted in the work itself. This process, though sufficiently explained, seems rather to belong to the operative chemist than to the student of mineralogy, and therefore we are not to expect to find here a very minute description of it, nor the tables which have been contrived to exemplify it.

The formulæ given in the work are principally the *mineralogical*, in contradistinction to the *chemical*. Beudant says of them, that it must be confessed they are less satisfactory than the chemical,—"il faut avouer quils sont moins satisfaisants pour l' esprit que les signes chimiques, et par cela même plus difficiles á retenir et á comparer les uns aux autres." As this subject of signs is one of the most intricate and the most difficult for the student to comprehend sufficiently to avail himself of their valuable aid, we are disappointed that in introducing them into his work, Mr. Alger had not devoted a longer chapter to a complete explanation of them, making plain by numerous examples the difference between the two kinds of signs, and the method of converting one into the other, and finally in the body of the book, gives not only the mineralogical but the corresponding chemical formulæ. For as the book is intended to be a complete elementary treatise, it must fall into the hands of many who have no other means of learning this most important branch of the science, and would naturally look for full information concerning so important a topic in this place.

The same remarks might be applied to the sections on *isomorphism* and *dimorphism*, phenomena as yet little familiar to scientific men, though they appear to play important parts in the composition and outward forms of minerals. The two short sections devoted to them contain a great deal for four pages, but they do not satisfy us, nor do they seem to satisfy the American editor, who states at the close of his remarks, that the former editions of the work contained no reference to the subjects, and that he had endeavored to give the most important facts in relation to them, though their omission was not observed in time to be supplied in an earlier part of the introduction. We trust, therefore, in another edition to hear more of these topics.

While we are alluding to what appear to us deficiencies, we might add, that as no one would be better able, from practical knowledge and experience, to compile an interesting chapter on the *uses of minerals* than Mr. Alger, we cannot but hope to see such appended to future editions of the work. A similar paper to that forming the last chapter in the first volume of Beudant's treatise, would, we are sure,

be quite as interesting, and much more generally read, to say nothing of its *practical* importance, than the excellent article on the forms of crystals. For without at all undervaluing the aid that an exact knowledge of this subject may impart in distinguishing similar species, its use is necessarily of so refined a nature, and requires so exact an instrument to determine the angles, that but few skilful scientific men will be likely to avail themselves of it. Even Mr. Alger, it seems, in order to leave no doubt as to the identity of *beaumontite* with *fleulandite*, "requested Mr. Teschmacher * * * * * to subject the crystals to measurement by the reflecting goniometer." The general reader and student will be much more likely to be deprived of the means of availing himself of the assistance of this delicate instrument, and of the full benefit to be derived from determining the angles of the crystals. As the arts are every day becoming more matters of science in this country, and practical men are turning from empirical methods of operating to the benefit derived from and through knowledge of the materials they use, and consequently look to works on mineralogy for a complete description of all useful minerals, we think that an article from the able pen of Mr. Alger on the subject we have referred to, would well please a large class of readers. It is true, there is no lack of description under the head of each species; under that of *Iron Ores*, as well as of *Coal*, we are pleased to find much more valuable information than is usually met with in works on mineralogy; but in the account of the *Limestones*, there are hardly any allusions to their practical importance, and one might look in vain for information concerning the various uses of the different varieties. Connected with the working of iron ore, limestone is almost as important as the ores themselves, and the adaptability of the different kinds of limestone for this purpose, as well as for the manufacture of hydraulic cement, &c., might properly demand some attention. So of all other minerals that are put to useful purposes.

We notice that several analyses have been made expressly for this work, and that they were of minerals of rather doubtful character, which required exact chemical examinations to place them in their true position. *Sillimanite*, which had been considered a compound of silica and alumine with zirconia, has been proved by the analysis of Mr. Hayes, to contain no zirconia, thus making its composition agree with that given it by Bower. *Washingtonite* of Shepard, by the analysis of Kendall, is shown to be a variety of *Ilmenite*, similar to that analyzed by Mosander. And by the analysis of *Stellite*, by Mr. Hayes, the three minerals *Stellite*, *Pekolite*, and *Wollastonite*, appear to be the same, the water being considered accidental.

By means of other analyses recently made, some new species are added to the catalogue of minerals of very interesting character, as *Hayesine*, or *Borocaleite*, *Pickeringite*, &c. The former of these, named by Mr. Alger in honor of the analyst, is a salt found associated with various other saline substances in Tarapaca, Peru; it consists of three atoms of boracic acid, one of lime, and six of water, being a hydrated ter-borate of lime. "It occurs in globular masses of a fibrous structure, having externally a brown color; when broken these masses

appear to be formed of snow white delicate fibres, interwoven, curved, and knotted; the lustre being satin-like, and the fibres so soft as to crush readily between the fingers. Placed in warm water it expands and forms a consistent paste, and exhibits numerous tufts of radiating fibres. It dissolves in dilute nitric acid, and the solution poured into a large quantity of ammonia, produces a precipitate which soon redissolves in the alkaline fluid. In moist air it attracts moisture, and exhales a peculiar odor. B. B, it intumesces, and gives off water; contracting, it becomes white and opaque. More highly heated it melts, and with continued bubbling, gives a clear white glass; with its bulk of soda it gives a glass which is clear and colorless while hot, but becomes opaque and crystaline on cooling. It encloses fragments of argillaceous slate with brilliant and perfect crystals of glauberite, which are sometimes penetrated by the fibres of the borate.

This is the first known occurrence of this rare salt in the mineral kingdom. It is found associated with various other saline substances in the Province of Tarapaca, Peru, and was brought to the United States by Mr. T. H. Blake, to whom we are indebted for much new and valuable information in relation to the rich mineral districts of Chili and Peru."

*Pickeringite* is "an extremely beautiful mineral, occurring in masses composed of long parallel fibres of a silky, or satin, lustre; color from white, or viewed in the direction of the fibres, pale rose red, or light green; compact, but easily divided parallel with the fibres; brittle; specific gravity 1.78 to 1.80. It swells when heated, and the white mass which remains tastes like alum. Its analysis afforded Mr. A. A. Hayes the following results:—

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|---|---|
| Water of crystalization, | 45.450 |
| Sulphuric acid, | 36.322 |
| Alumina, | 12.130 |
| Magnesia, | 4.682 |
| Protoxide of manganese and iron, | 0.430 |
| Lime, | 0.126 |
| Muriatic acid, | 0.604 |
| | 99.744 |

This mineral appears to be a very pure native magnesian alum, and very nearly answers to the composition of a magnesian alum from South Africa, analyzed by Stromeger. * * * * *

It occurs abundantly in the province of Tarapaca, in Peru, associated with glauberite, hydro-borate of lime, and *iodate of soda*, hydriodate of soda, sulphate and biborate of soda, chloride of sodium, and organic matter."

The massive scapolite rock of Hitchcock, found at Canaan, Connecticut, is lately discovered by Dr. Dana, of Lowell, to be a new combination of lime, alumina, silica, and protoxide of iron, and he has given it the name of *Canaanite*.

To Mr. Alger is due the credit of proving the identity of the *Lincolnine* of Hitchcock with the *Beaumontite* of Levy, and both these are now returned to their proper place as varieties of *Heulandite*.

The mineral *Ledererite*, which has been supposed by some to be identical with *Smelinite*, Mr. Alger has shown cannot be the same, inasmuch as it contains phosphoric acid, as an essential constituent part united with the lime; and this, therefore, retains its place as a distinct species with the formula given it by Berzelius, based upon its analysis by Hayes. Not only is the existence of the phosphoric acid, which is considered by Mr. Hayes and Mr. Alger, and apparently by Berzelius also, as well as by Rammelsberg in his Handwörtenbuch, essential to its composition, but in hexahedral cleavage is also opposed to its being identical with chabasie, whose primary form is an obtuse rhomboid.

In some of the editorial notes we find interesting notices of different minerals, two of which it may be well to transcribe. One is in relation to the mineral *Condrodite*, frequently called *Brucite*, (though it would seem this latter name ought rather to be given to the hydrate of magnesia, which was actually discovered by Dr. Bruce.) This *Condrodite*, though found in only two localities in Europe, one at Pargas, in Finland, and the other in Sweden, occurs in fine specimens in Orange county, New York, and in several localities in New Jersey. The editor remarks on its history as follows:—"There is no mineral in the whole range of the science that offers a more interesting history than the present species, considered in reference to its chemical nature, and it is to American mineralogists and chemists, that we owe our most important knowledge concerning it. Dr. Langstaff, of New York, was, unquestionably, the first to detect the presence of fluoric acid in the New Jersey mineral,* while Mr. Seybert, of Philadelphia, has the honor of having first discovered it in the Pargas variety,† in which it seems to have been overlooked both by Berzelius and D' Ohsson, who had examined it; but Dr. Langstaff's results had not become generally known, when, in 1822, and previous to his examination of the Pargas mineral, Seybert‡ announced his discovery of fluoric acid in a specimen from New Jersey, without the least knowledge, as he declares, of what had been done by Langstaff. He had inferred from their characters, that brucite and condrodite were different minerals, though Berzelius had viewed them as identical; but the result of his examination was finally to show the existence of fluoric acid as an essential constituent of both, and to establish their identity. Soon after, Dr. Thomson made known his analysis of the New Jersey mineral, and fully confirmed Seybert's. Thus it appears that Seybert, equally with Langstaff, was the discoverer of fluoric acid in condrodite. It should be added that several years before Seybert had announced his discovery,—Dr. Torrey, of New York, read before the Lyceum of Natural History, his analysis of brucite, in which he had found a large portion of silica, and proved the mineral to be a fluo-silicate, and not simply a fluate of magnesia, as it had been regarded by many of our mineralogists, and under which name it was mentioned in the first edition of Cleaveland's Mineralogy. At this time he was not aware of Langstaff's prior experiments. The

* The date of this discovery is 1811; Amer. Journ. Science, vol. vi, p. 171.
† Amer. Journ. Science, vol. v, p. 336. ‡ Ib. vol. v. 336.

analysis by Berzelius I have not been able to find; Langstaff obtained silica 32, magnesia 51, oxide of iron 6, fluoric acid 9, water 1. It was at first supposed to be sphene by Dr. Bruce, the original discoverer of the mineral in the United States." There are six analyses of the above species given in the text.

The note to page 168, is equally interesting to American readers, showing to us that more than twenty years since our chemists were as exact in their researches as the most celebrated of Europe. After describing the *Chrysoberyl*, we have this account of the discovery of its real character.

"It is to the sagacity of an American annalist, *(analyst)* Henry Seybert, that we owe our knowledge of the true nature of this mineral. In 1822 he analyzed the Haddam and Brazilian chrysoberyl, and detected in both the presence of glucina, though the latter had been previously analyzed by Klaproth and Arfwedson, both of whom had overlooked that substance. Dr. Thomson has more recently verified the result obtained by Seybert, which is the more important, as Beudant has adopted the analysis of Arfwedson, though aware of what Seybert had done; and others seemed undetermined as to the true nature of the mineral. I have thought it proper to record each of the several analyses which have been made, and it appears from them not a little extraordinary that while the analysis of Dr. Thomson showed that this mineral contained no silica whatever, Arfwedson should obtain nearly nineteen per cent. It is evident that the latter not thinking to look for glucina, confounded this earth with alumina; but it seems scarcely possible that he could have mistaken glucina, or alumina, for silica. The mineral has not been analyzed by Berzelius, but H. Rose has confirmed Dr. Thomson's results in proving the absence of silica; we are thus equally indebted to Seybert and Dr. Thomson for our most accurate knowledge of the chemical constitution of this species."

With these extracts we close our remarks upon this interesting and highly creditable work to American science, only repeating our hope that if Mr. Alger should ever publish another edition, he would finish the work he has now only half done, and *thoroughly* Americanize the book. It needs some little revision, some correction of typographical errors, and an expunging of a few obsolete words, or terms, now little used, as "greywacke," &c., which, if familiar to the scientific men of Europe, have no definite meaning here; and if in following too closely a foreign author, some of his errors should have remained attached to the work, as in placing our favorite *Meerschaum* among the earthy carbonates, instead of giving it its real siliceous character, we have reason to believe that if Mr. Alger should come forth on his own responsibility, all these would disappear, and his book would take a still higher rank, than the present edition, among the standard publications on mineralogy.

## FRANKLIN INSTITUTE.

### *On Rickett's Improvement in the Piano Forte.*

**The Committee on Science and the Arts constituted by the Franklin Institute of the State of Pennsylvania, for the Promotion of the Mechanic Arts, to whom was referred the examination of the improvement (so called) in the Piano Forte, by Lovering Ricketts, respectfully REPORT:—**

That they have examined with care the piano exhibited to them by Mr. Lovering Ricketts, and find the alleged improvement to consist of springs to which the strings are directly attached. In the language of his patent, his claim consists in the "application of my metallic springs to the piano, harp, and all other musical string instruments, as an improved substitute to the common hitch pins now used, and for the purpose of giving elasticity to the strings, and for keeping them in tune for a long period of time."

In the piano examined by the committee, blocks of metal are inserted into the plate of the instrument, to which horizontal springs are attached, and the strings are hooked upon the ends of these springs, so that when the strings are tightened by the turning of the pins when the instrument is tuned, the strain bends the springs until the resistance is such as to maintain the string at the degree of tension necessary to sound the desired, or proper, note.

On examination it was found that the springs operated, according to the views of the patentee, as the strings were strained by the tuning pins, they slipped by the pins of the bridge, and drew the springs until the tension was equalled by the resistance necessary to produce the required note, and that upon turning the tuning pins backward the springs drew the strings back, and the note fell as the tension diminished; thus showing that the operation of the springs was, so far, satisfactory.

It is probable that the views of the patentee are correct in the supposition, that the construction of a piano on this principle will enable it to remain in tune a longer time; or, more exactly to express the views of the committee, it will go out of tune more gradually than those of the usual construction; but this assertion is entirely comparative; how much slower, would require a careful comparison with other instruments of the same general construction, and a similar grade of workmanship and material: that it will go out of tune from all the usual causes is beyond a doubt, as those causes will affect the instrument under consideration in the same manner, and to the same extent as any other, such as constant tension upon the string itself, the expansion, or contraction, from changes of temperature, and the general yielding of the wood work forming the body of the instrument.

There is reason to doubt the purity of tone to be derived from a string, the strain of which is supported in the manner described by the patentee.

A light blow of the hammer it is probable would not affect the spring, and a perfect vibration would be produced, but if a heavy

blow should be given, and "repeated," as is usual in the modern style of playing, is it not evident that the spring would yield, and as a consequence, the length of the string be augmented between the bridges, producing, for the time being, a note, or chord, out of tune. And again, suppose, what is so usual in music, a light passage in the treble, not affecting the springs, in that part of the instrument, and a heavy, or loud, chord on the bass acting powerfully upon the springs, the bare supposition is a dissonance too great to be borne with composure, and that such is the fact the committee have abundant evidence.

This inseparable disadvantage must be increased by perfection of workmanship, and the improved action of the spring consequent therefrom. Mr. Ricketts' instrument appears to have been got up in haste, and is not, therefore, amenable to this remark in its greatest extent.

In the claviole of the ingenious John I. Hawkins, an instrument of extraordinary power and beauty, a combination was attempted by which the effect, expression, and compass of the violin, tenor, bass, and double bass, in short, the stringed quartette was to be brought under the hand by means of the ordinary finger-board of pianos and organs. In this instrument a difficulty occurred which taxed, to their fullest extent, all the inventive powers of this extraordinary man—and that was the maintenance of the proper degree of tension of the strings made of animal tissue, a well known difficulty in all instruments of music in which these kinds of strings are employed—hygrometric changes, as well as those of temperature, affecting them rapidly, and to a great extent.

This difficulty Mr. Hawkins attempted to meet by the introduction of springs, to which the strings were attached, so as to maintain a tension proportionate to the changes, hygrometric and otherwise, which always affect these means of producing musical tones. His singular sagacity must have been severely tasked, as we have evidence that he introduced progressive lever arrangements in conjunction with springs, on the general principle of the fuzee of the watch, in the endeavor to meet the contingencies of the case. These and other difficulties have doubtless hitherto prevented the adoption of an instrument, which, if it could be perfected, would be of incalculable value to the musical world. The same mechanical genius made pianos with spiral metallic springs, which sustained the tension of the strings, one of which was used in this city, with all the disadvantages which have been noticed in the foregoing paragraphs.

The general inference which is to be drawn from this report, is decidedly unfavorable to the alleged improvement; as it regards its novelty, we have to add, that besides its general principle, as employed in the claviole and piano forte of Hawkins, we have evidence that pianos were made in Liverpool, to the strings of which ordinary springs were attached, one of which was sold in this city.

These facts and circumstances relate to a period of time about one third of a century antecedent to the date of this report.

By order of the Committee, WM. HAMILTON, Act'y.

*Philadelphia, December 12th*, 1844.

## MECHANICS, PHYSICS, AND CHEMISTRY.

### *On the Chemical Reactions produced by bodies which intervene only by contact.* *By* E. MITSCHERLICH, (Ann. de Ch.)

TRANSLATED FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

(Continued from Page 197.)

We may better comprehend the action of bodies which affect each other by their contact, when we study the cases in which decomposition is effected. If ammoniacal gas is passed over turnings of copper, or iron, incandescent, it is completely decomposed into azote and hydrogen gases,—whilst, in passing it, at the same temperature, over platina turnings, or fragments of glass, it is not decomposed except in extremely small quantity.

The decomposition of the binoxide of hydrogen is of the highest importance; it takes place only at the surface of solid bodies, and in proportion even to the extent of that surface; but bases and acids act upon it in very different manners: the former provoke the decomposition of the binoxide of hydrogen, the latter render it more stable.

The decomposition of the chlorate of potash in contact with the oxide of copper, the binoxide of manganese, and other oxides of this kind, is also a thing of particular interest. When we heat chlorate of potash it melts, and at a higher temperature it is transformed into oxygen, chloride of potassium, and into hyperchlorate of potash, which, in its turn, is decomposed into oxygen and chloride of potassium; but if, instead of heating the chlorate of potash alone, we previously mix it with one of the oxides I have just mentioned, it is transformed into oxygen and chloride of potassium at the temperature of fusion, without the production, in this case, of hyperchlorate of potash.

To give an exact account of the action of the oxides, in this case, we may perform the following experiment:—Put into a stoppered tube a mixture of oxide of copper and chlorate of potash, and into a second introduce chlorate alone; furnish them with bent tubes for collecting the gases, and place them together in an alloy bath. At a certain temperature the chlorate mixed with oxide is completely decomposed, whilst the simple chlorate has not yielded a trace of oxygen. By mixing chlorate of potash with silica, it is decomposed absolutely like chlorate alone.

The decomposition of chlorate of potash is accompanied by a development of heat. This phenomenon is witnessed during the decomposition of the binoxide of hydrogen. It is to this heat, or rather to the cause which developes it, that we are to attribute the simultaneous decomposition of oxygenated water and oxide of silver, as well as other oxides which lose their oxygen at an elevated temperature.

The transformation of lignin and of starch into dextrine, and that of dextrine, of gum, and of sugar, into glucose, is produced by a liquid body.

We know that in boiling starch with dilute sulphuric acid, it is promptly converted into dextrine and glucose. At whatever period of the operation we may examine the liquid, we find in it free sulphuric acid, and always in the same quantity; but the reaction, which consists in a simple fixation of water, goes on the more rapidly the more sulphuric acid is employed.

We may effect the same transformation by using nitric acid, and thus obtain an intermediate product which possesses some interest. Take, for example, forty parts of dry starch, and moisten it with one and a half parts of water, and then add two per cent. (of the starch,) of nitric acid—leave this mixture to dry, at first in the open air, and then in a water bath. The dry mass is to be dissolved completely in water, and in using but five parts of water to one of starch, the solution gelatinizes on cooling. In this state it much resembles dissolved starch (empois) that many of the masses supply, and which is commonly prepared from lichens, or seaweed. If this solution be boiled a long time, and especially if a little acid be added, it loses the property of gelatinizing. The formation of dextrine and glucose is due to the fixation of water determined by the action of the acids.

The conversion of starch into dextrine may also be effected by the aid of a temperature of 150°. Thus the acids and heat operate precisely like platina and heat in the combination of hydrogen and oxygen. Diastase, at the temperature of 75°, acts, with respect to starch, like acids. As this substance has not hitherto been obtained in a state of purity, we cannot prove that it has not undergone some alteration during the transformation of starch; and yet, since the reaction is effected by so very small a quantity of diastase, even when impure, we may reasonably admit that it acts only and truly by contact.

A few hundredths of sulphuric acid added to a solution of cane sugar, is sufficient, even in the cold, to change it to glucose, and to enable us to prove its existence in the fluid by sulphate of copper and potash. Other acids transform it also in the cold. Acetic acid does the same, but only when hot.

It is for this reason that lime is added to the saccharine juice of plants when cane sugar is to be extracted. I have examined the juice of beets, and have always found it perfectly neuter, so that the transformation we have spoken of is impossible in the beet itself; but every wound may become the cause of the production of acids, and then the sugar is subjected to alterations.

I have obtained the sugar derived from the action of sulphuric acid on cane sugar in the state of crystals. The sugar obtained by adding beer yeast to a solution of cane sugar, appears to differ from grape sugar. I have not been able to obtain it crystalized, and it rotates polarized light much less than an equal quantity of grape sugar. Its formation is very remarkable: it is owing to a substance mingled with the globules of ferment; it is the aqueous solution of this material which determines the change of cane sugar into this new kind of sugar. On this account fermentation takes place much more slowly in a solution of cane sugar, when washed yeast is employed instead of common yeast. In the former case, give common yeast the time

necessary for a part of it to become transformed into this soluble body. Common yeast excites fermentation as quick in a solution of cane sugar, as in one of glucose.

This kind of sugar differs in other respects from that obtained by melting cane sugar.

In melting cane sugar at a temperature of 160 degrees, it becomes completely deliquescent, dissolves in absolute alcohol, ferments when put in contact with a ferment, and exerts on polarized light much less influence than that of grape sugar.

Cane sugar, after being melted, no longer crystalizes; but if melted with water, care being taken not to raise the temperature above 154°, it produces, on cooling, a vitreous mass, composed chiefly of cane sugar and water mechanically enclosed. The latter dissolves the particles of sugar one after another, and deposits them in crystals, for an amorphous body is more soluble than a crystalized body. The whole mass passes to the crystaline state. It is easy, in breaking a stick of such sugar, to perceive the presence of water, especially near the centre, and among the crystals. It is possible that this sugar may be identical with that procured by keeping a solution of cane sugar a long time at the temperature of 110°, and which, according to M. Fensky, exerts no action on polarized light. Perhaps it is identical also with that which M. Peligot and M. Mulder, procured by boiling cane sugar a long time with dilute acids, and which, they say, does not crystalize.

Chemists are agreed relative to the changes which glucose and other kinds of sugar undergo during fermentation. It is generally admitted that carbonic acid is formed with a third part of the carbon of the sugar, while the remaining two-thirds unite with the hydrogen and oxygen to form alcohol. Thus for one measure of carbonic acid, one measure of alcohol is produced; but, according to the kind of sugar, there is an elimination, or a fixation, of water; the first case presents itself in glucose, the second with the variety of sugar soluble in alcohol. The body which determines this action, the only means by which it can be produced, is an organized body.

We may, without entering into a detail of the opinions to which this phenomenon has given rise, discuss the facts which alone possess any interest in this question. Ferment is composed of oval and round globules; these globules are large enough to be retained by filtering paper. If we put a small quantity of ferment into a tube closed at one end with blotting paper, and introduce it into a solution of sugar, the latter passes through the pores of the paper, and undergoes the alcoholic fermentation, but only in the tube which contains the ferment. The fermentation goes on in the solution in which the tube has been placed only after a longer, or shorter, period, and always under the influence of globules of ferment, which eventually pass through the pores of the paper, which softens by its prolonged contact with the liquid. This experiment plainly proves that fermentation goes on only at the surface of the globules of ferment.

I have made other experiments which prove what has just been advanced. M. Schwann has made others, but they are not so deci-

sive as those just stated. I have never seen fermentation without globules of ferment, and the phenomenon always appears at the surface.

It requires but one per cent. of globules of ferment to effect the complete transformation of sugar into alcohol and carbonic acid, and when we use globules perfectly organized, they undergo almost no change during the fermentation. When destroyed they are no longer effective. In placing them in contact with bodies which have the property of arresting fermentation, we perceive them to contract when examined by the microscope, at the moment of touching these bodies.

Globules of ferment therefore when mingled with sugar, or sugar and water, which contain the elements of carbonic acid and alcohol, act precisely like spongy platina, with respect to oxygenated water.—Naturalists, occupied with the study of the most simply organized beings, declare that globules of ferment ought to be ranked among them; and, in reality, considering their generation and development, we can come to no other conclusion. Thus, generation always takes place in the fermentable juices of plants, and before fermentation commences in them.

It is only at the end of three days that we remark in these liquids microscopic points, isolated, or united into chaplets;—these points expand, and we may plainly perceive that their increase occurs from within outwards; and eventually we observe in their interior a granulated mass surrounded with a transparent envelope. They are often elongated, and then they exhibit two or three granular points.

By using perfect globules of ferment for exciting fermentation in sugar, I have not perceived them to develope; but by leaving the ferment for some time they are seen to ramify in the manner of confervæ. The organized beings that are formed in whey ramify in whorls. The sediment which occurs in whey in the course of a few days, is, like ferments, organized, but mingled very often with unorganized substances. Agreeably to several naturalists—MM. Schultz, Schwann, and others—these beings are not reproduced when access of air is prevented, and never when matter susceptible of being converted into ferment, are fed with air previously exposed to a red heat. This is one proof against *equivocal generation*, while the supposition that the origin of an organized being in a liquid springs from a point that escapes observation, leads to a conclusion favorable to such generation.

It would be important to know what these beings would become, if, instead of being developed in a liquid, their expansion took place in the open air. Would it result in a mucor, as M. Kutzing supposes? A mucor added to a fermentable liquid excites no fermentation, and moist ferment, long exposed to air, is not transformed into mucor.

The presence of these organized beings in the intestinal tubes of herbivorous animals possess a special interest; we may assure ourselves, by the method of M. Tromener, that there is grape sugar in an animal which has eaten vegetable food. It is found in the stomach,

and intestinal tube, as far as the rectum only. We find great numbers of organized beings in these parts of the organism, but they disappear entirely in the rectum and in the fecal matter. M. Remac first drew my attention to this, and since then M. Purkinjes, M. Bohn, and my brother, have had occasion frequently to observe them. It is very probable that in addition to digestion, a true alcoholic fermentation takes place in the intestinal tube occasioning ventuosities. The blood which surrounds the intestinal tube, dissolves carbonic acid, which may be disengaged by the lungs without recurring to other modes. These organized beings, commonly of an elliptical form, have two transparent points, and sometimes enclose a granular mass like those of ferments.

MM. Boutron and Fremy have recently proved that lactine is transformed into lactic acid under the influence of caseum, and that this combines with the acid formed. Further, in separating caseum from its combination with lactic acid, by means of carbonate of soda, a fresh quantity of it is produced. The composition of lactic acid is such that it is represented by sugar of milk, minus a certain quantity of water. I have repeated these experiments with the same results; but, as in this reaction, a compound is formed of caseum and lactic acid, we must suppose that the affinity of lactic acid for caseum intervenes in the phenomenon. The coagulation of milk, however, in the preparation of cheese, seems to be owing to other causes, since rennet is commonly employed to produce it.

We generally suppose that it is the internal part of the stomach of the calf which causes the coagulation of milk. It is not so, however; the rennet that I obtained was prepared from mucus and the muscular membranes which are taken from the stomach, rejecting the peritoneum: but I could easily coagulate milk by making use of other parts of the peritoneum,—the part, for example, which covers the cæcum.

When we take the precaution to raise the temperature of milk a little, coagulation takes place in a few hours, either by suspending the membrane in it, or pouring into the milk a warm infusion of it. The membrane and its infusion have no acid reaction, and the milk remains neuter during its coagulation.

The chemical combinations which are established by means of substances which act only by contact, are very analogous to those which are produced, when, for example, one body combines with a second, and the resulting compound acts upon a third.

Sulphurous acid has more affinity for oxygen than the binoxide of azote; and yet sulphurous acid does not combine with oxygen when we allow the mixture of these gases to remain long in contact, whilst the binoxide of azote directly seizes gaseous oxygen to form hyponitric acid. The latter yields its oxygen to sulphurous acid to become again binoxide of azote. The oxygen then in hyponitric acid is in a state which enables it to combine with sulphurous acid. Putting a mixture of oxygen and sulphurous acid in contact with spongy platina, the two gases combine; the action of the platina is, therefore, in this case, the same as in hydrogen and oxygen.

All these processes, and especially the production of the ethers, and of the ether itself, lead to the conclusion that chemical decompositions and combinations may be prevented by the respective position of the atoms; but that the force of attraction which certain bodies exert on the atoms of those into whose presence they are placed, may change the position of them in such a way as to determine chemical reactions. The manner in which gases act with charcoal, and especially with platina black, proves that this attraction is very strong even with respect to bodies of different natures.

Berzelius gives to this force the name of *catalytic force*, with as much reason as we say force of affinity, &c., and understand by this denomination a force which is appropriated to many substances which do not enter chemically into the reactions which they excite, and whose activity consists in destroying chemical combinations. In order to affix a term to the phenomena, I have named these substances *contact substances, (contact substanzen,)* and the chemical process, a decomposition, or a combination by contact.

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*Notice of the Manufacture of Glass in Bohemia. By* M. L. P. Debette.—[Annales des Mines, 4th series, volume iv, page 553; December, 1843.]

TRANSLATED FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

(Continued from Page 192.)

## Chapter IX.—*Of Opalescent Glass.*

The milky-white glass imitating alabaster, or opal, is prepared like the fine colorless glass, only with the addition of a greater, or less, quantity of calcined bone powder, according as a more or less opaline glass is desired. A great quantity of opaline glass colored green, is also manufactured in Bohemia; formerly it was prepared by adding to colorless glass a certain quantity of calcined bone powder, yellow oxide of uranium, and oxide of iron, (finery cinder.)

This color is altered after long exposure to solar light. For some years past it has been replaced at Winterberg and at Silberberg, by a more beautiful color, due to calcined bone powder, yellow oxide of uranium, and oxide of nickel. The oxide of tin is employed solely in the manufacture of enamels, because it is far more dear than the calcined bone powder, (phosphate of lime—bone earth,) and because it requires a larger quantity to produce the same effect.

## Chapter X.—*Of Hyalite.*

The name hyalite is given to a completely opaque glass, generally black, which is distinguished by a hardness and lustre truly remarkable, and forming a beautiful contrast with gold. It may without any inconvenience, be employed for the manufacture of vessels intended to hold boiling liquids, such as tea-pots, coffee-cups, &c., without any danger of its breaking. It was first made in 1820, at

the establishment of Georgenthal, near Gratzen, and M. le Comte de Buquoi, who invented this beautiful product, has secured the invention to himself by a patent right. To prepare this black glass there must be added to the materials, for white glass, a certain quantity of poor forge cinders pulverized, charcoal dust in excess, and calcined bone powder.

It often happens either that the melting of the glass is not complete, or that the mixture, or the proportions, of the ingredients was not right. The glass obtained must then be calcined and quenched, powdered again, and remelted after having had added to it what may have been missing. The forge cinder may be replaced by basalt, or lava. If sufficient carbon has not been added, the glass takes a more or less deep green color, and presents, upon cutting, very regular mottling. The same is true of the more or less deep yellowish brown hyalite, which is obtained by replacing the forge cinder by the cinder from the argentiferous lead furnace of Gutwasser, near Budweis.

A red hyalite may also be obtained with calcined bone powder, oxide of copper, carbon, &c., and all these varieties present a marbled structure upon cutting.

The black color of hyalite may perhaps be explained in the following manner:—In the presence of an excess of silica, the oxide of iron is not reduced, but only brought by the carbon into the state of protoxide, and tends to color the glass deep green. The excess of carbon, probably by transforming the small quantity of alcaline sulphates present in the glass into sulphurets, tends, on its part, to color it of a more or less deep topaz yellow, passing even, in certain cases, to a purple red.

Now we know that we can obtain black by a mixture of green and red; the only difficulty then consists in employing the proper proportions of oxide of iron and carbon.

If the quantity of carbon is insufficient, the hyalite will take a greenish color, and will be composed of concentric zones having different shades, which may be made apparent by cutting. Should we attribute the formation of these zones to a devitrification analogous to that which is presented by many furnace slags, to an oxidation, or to a reduction which is propagated from without inwards, during the working and annealing of the glass? This is what cannot be decided without some experiments not yet made. All that we have here said relative to the black, and to the marbled green hyalite, applies equally to other hyalites; and, in short, we may say that hyalite is fit to take the place of porcelain in a great many cases, possesses far more lustre, and is capable of receiving a more perfect polish.

## Chapter XI.—*Of the manufacture of Enamelled Cast-Iron Vessels.*

Iron pots, and especially those of enamelled cast-iron, are very extensively used in domestic economy. To enamel these vessels they are cleaned as perfectly as possible with weak sulphuric acid, then washed with cold water, and dipped into a thin paste, made with quartz first melted with borax, feldspar, and clay free from iron, reduced to an impalpable powder, and sufficient water to form a rather

thin paste. These vessels are then powdered in the inside with a linen bag, containing a very finely pulverized mixture of feldspar, carbonate of soda, borax, and a little oxide of tin. Nothing then remains but to dry the pieces, and heat them in an enamelling furnace. The coating obtained is very white, resists the action of fire without cracking, and completely resists acid, or alkaline, solutions.

### Chapter XII.—*Of the Cutting of Glass.*

All the fine glasses called Bohemian crystal are cut. For this purpose are used vertical wheels of iron, wood, or stone, moved by the foot, or oftener by a water-wheel by means of pullies and endless bands. The iron mills are used to rough-grind the pieces, water is fed to them continually by means of a shoe placed above, and below is a box containing sand, which the workman throws by hand upon the mill. The pieces are then passed to wheels made of sand stone, and then upon wooden wheels, first with the mud from the sand previously employed, then with emery finer and finer, and finally finished with jewellers' putty, which is often put upon a dry wheel covered with cloth coated with this substance. For some years past many articles have been made partly polished and partly mat. The mat parts are obtained by rough-grinding the glass in spots without polishing it. Hydrofluoric acid liquid, or gaseous prepared with two parts, by weight, of fluor-spar, and four parts, by weight, of concentrated sulphuric acid, is also often used for this purpose, or for engraving upon the glass; care is then taken to cover all the glass with a varnish formed with four parts of wax, and one part of essence of turpentine, which is then removed by a graver from the parts to be attacked.

### Chapter XIII.—*On the art of Gilding, Silvering, Platinating, and Incrusting Glass.*

*Gilding.*—To gild glass they take gold nearly pure, which is dissolved in aqua regia, and then precipitated from its solution by caustic potassa, or better still, by protosulphate of iron, in which case the purity of the gold is altogether indifferent. The precipitate formed is washed upon a filter with boiling water, completely dried, then mixed with a little calcined and finely powdered borax, and the whole reduced to a thick paste with a little essence of turpentine. This paste is applied upon the glass by a pencil; it is then placed in a muffle furnace at a temperature sufficiently high to volatilize the turpentine, and vitrify the borax. The gold is then found solidly fixed upon the glass, and all that remains is to burnish it, which is done first with a polisher of blood stone, then with a burnisher of agate. The red and black glasses, the hyalite, and sometimes blue and green glass are those principally gilded.

*Silvering.*—The silvering is performed precisely in the same way as the gilding. The powder of silver required is procured by precipitating nitrate of silver by a bar of copper. The silver harmonizes particularly well with the white, green, and blue opaline glass.

*Platinating.*—Platinating is much less used than gilding and sil-

vering, and is performed in the same way, the powder of gold, or of silver, being replaced by the double chloride of platina and ammonia well washed. The color of the platina approaches more nearly to that of steel than to that of silver.

*Incrusting.*—The art of incrusting in glass appears to have been invented in Bohemia, about six centuries ago; it was afterwards entirely lost, and has but recently been recovered. At present they incrust in a great deal of glass, while making it, small objects in white clay, which have, when the glass is finished, a deceptive lustre, and appearance of mat silver.

## Chapter XIV.—*Manufacture of Looking Glasses.*

Almost all the looking glasses made in Bohemia are small and blown; there is but one establishment, that of Deffernich, belonging to MM. Abele, where they cast their mirrors, and these proprietors being of French origin, use the processes of our own country. I shall, therefore, have but little to say upon this manufacture.

The Bohemian looking glasses are of potash base, as we have seen, and have for their formula (K Ca Al) $S^3$; while the French glasses have soda for their base, and their composition, according to Dumas, is expressed by (N Al Ca) $S^6$. This difference arises from the fact that potassa being a less energetic flux than soda, it is necessary to use a much more considerable quantity, in order to produce a glass of the same fusibility, and even then the glass produced is less hard than that of soda base, which joined to the greater cheapness of this latter, has caused a preference for it, as is the case in France.

*Manufacture of Blown Looking Glasses.*—The blown looking glasses are made in rectangular furnaces, containing upon each shelf three circular pots, which last from three to four months, and hold about three hundred and ninety-six pounds. Each melting furnace has six flattening kilns annexed to as many annealing ovens, and arranged exactly as those of which we have spoken in the article upon the manufacture of window glass, with these differences:—1st. that they are larger; and 2d, that they place the fuel upon a lateral brick grate, separated by a small bridge from the flattening kiln, from which the flame passes into the annealing oven.

In all these are employed two firemen, and five melters at the melting furnace, and three workmen at the flattening kilns. The manipulation is the same as in the manufacture of window glass, and consists in blowing large cylinders, which are then opened in the direction of their axes, only the operation is more difficult in consequence of the size of the pieces worked. After twenty-four hours melting, the five melters unite to work the glass of one of the pots, they then rest for two hours, pass to the second pot, and so on. The working of each pot lasts about two hours, so that a complete melting lasts about forty-eight hours, and there is used in this time, in the melting and flattening furnaces, of wood dried in the air (1925.694772 cubic feet,) about 15 cords.

*Manufacture of Cast Mirrors.*—The cast mirrors are manufactured exactly as at St. Gobain. The furnace is square, and holds

four pots having the forms of a reversed pyramid with a square base, which contain each 246.5 pounds of glass. When the melting is finished the thin brick wall opposite to each pot is destroyed, and the pots are then moved to the casting table by means of a carriage composed of curved tongs mounted upon wheels, the degree of separation of which tongs may be regulated by means of a ring sliding upon their handles. The casting table is of copper, and upon the edges are placed two rules of iron parallel to each other, and of a variable height according to the thickness to be given to the mirror; between these the glass is run. The surface of the cast mass is then flattened whilst it is still soft, by means of a hollow cast-iron roller welded to a wrought iron axle about 20.5 inches in diameter, which moves upon the iron rules, and weighs from about 650 to 1000 pounds, according to the size and thickness of the mirrors cast. The mirror and the slab which supports it are then slid into an annealing oven previously heated to dull redness, where it is left to cool very slowly.

*The Polishing of Mirrors.*—The mirrors, whether blown, or cast, must be polished before being silvered. This polishing requires a previous rough grinding, which is performed by rubbing one glass over the other with river sand, a quartz granulated and pulverized, or even simply pounded granite interposed; for this purpose the glasses are fixed with gypsum upon slabs of lithographic limestone, which is obtained from Nuremberg.

A water-wheel gives a backward and forward motion to the upper slabs which are allowed to turn upon themselves, and which slide over the lower slabs which are fixed; the only labor of the workman consists in giving, from time to time, a motion of rotation to the upper slabs, and stirring up the mixture of sand and water upon the lower slabs with a wooden trowel. Of course, sand more and more fine, must be used as the operation advances. A single workman can attend to two large glasses, or to four small ones. After this the polishing of the glasses is executed by rubbing them with a row of small slabs of Nuremberg limestone, either four or eight, according to the size of the glasses to be polished, and provided upon their rubbing surfaces with felt, coated with colcothar. (jeweller's rouge, red oxide of iron.)

*Silvering the Mirrors.*—In silvering the glasses a large slab of Nuremberg lithographic limestone is used, upon which is first spread a sheet of tin by means of a wooden roller, which is then smoothed with a hare's foot, and an excess of mercury poured upon it, which is spread with the same hare's foot until the leaf is entirely amalgamated. During this operation a part of the mercury flows off and is collected upon a table with raised edges, upon which the slab rests. The mirror to be silvered is then slid upon the edge of the lithographic stone, and finally laid flat upon the amalgum of tin which attaches itself to it. The glass is then coveredwith slabs of the limestone, (wrapped in muslin, so as to avoid scratching it,) in order to free it by pressure from the greatest part of the excess of mercury. Twenty-four hours afterwards the whole is lifted up, and the glass is moved to the upper story of the shop, where it is placed upon trestles

first horizontal, then gradually inclined until the mirror has a vertical position. It rests in this way for several days, and may then be exposed for sale. The entire duration of an operation of silvering lasts from two to four weeks, according to the size of the mirrors.

### Chapter XV.—*A general statistical view of the Glass Works of Bohemia.*

The glass works of Bohemia may be divided into three distinct groups. The two first situated, the one in the north in the *Reisengebirge*, the other in the south in the *Böhmerwaldgebirge*, are employed in the manufacture of glass in general, whilst the third, situated in the west in the part of the *Böhmerwaldgebirge* belonging to Bavaria, include only manufactories of blown mirrors. In fine, there are in Bohemia one manufactory of cast mirrors, *(Deffernick,)* thirty-one manufactories of blown mirrors, of which seven make, beside, table glass, and sixty-seven glass works properly so called, of which thirteen manufacture window glass, fifteen fine table glass, or Bohemian crystal, one hyalite *(Georgenthal,)* one composition glass *(Josephthal,)* one flint glass *(Neuwelt,)* and five in which they mould under pressure.

There exists besides in the north of Bohemia, principally near Hayden, a very great number of small establishments which are employed either in the cutting and finishing of glass which they buy in a rough state at the manufactories, or more frequently in the manufacture of false pearls, which are made of small hollow bulbs of glass into which a solution of the scales of the bleak *(lenciscus)* in ether has been introduced. These different glass works afford subsistence to more than 30,000 persons.

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FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

### *Contributions towards a History of Inventions, or Memoranda collected chiefly from obsolete Authors.*

The following observations may be interesting to modern mechanics, not only by showing what has been done, or proposed, but as affording useful hints. The selections may not always appear judicious, yet when the subject is of little moment, it is sometimes associated with writers, customs, or historical data, &c., worthy of note; on the whole there may, I think, be drawn from them "both pleasing and profitable uses by those that have either witte, or will, to applie them."

There are abundant proofs of a spirit of active inquiry into the useful arts in the latter part of the fifteenth, and throughout the sixteenth and seventeenth centuries. A few scientific men began the study of mechanical philosophy, and artizans became alert to find out new inventions. In the reign of Elizabeth, English mechanics were repeatedly bringing forth novel projects, and soliciting exclusive privileges. Our information respecting the nature of the devices, is, however,

exceedingly meagre; no doubt many were worthless, yet nothing is more certain than that during the administration of Elizabeth and her immediate successor, there were men in possession of the most valuable ideas, the maturity of which has since gone far to renovate society; but inventors, or projectors, as they were called, were considered little better than maniacs—they were staple butts for wits to expend their shafts on. Had any one European government of that epoch devoted a small portion of the wealth, lavished on court parasites, to the development of useful mechanism, the country might have been at this day in advance of all others.

In 1593, Hugh Platte, an English gentleman of education, and keenly alive to mechanical improvements, issued "An apologie for certain new inventions." Their *effects* only were described, but he was ready to exhibit the machines, and put them in operation upon receiving, or on having secured to him, a reasonable remuneration. Certificates, or recommendations, from competent persons accompanied the announcement, but all was in vain. Platte experienced the same species of neglect as his predecessors and successors did, and of which he justly complains.

In the following year he published a collection of various devices, not those referred to in his apology, but chiefly such as he had gathered from books, or from friends. Several he tested by experiments; his book is obviously similar to previous publications of the kind, resembling somewhat the pamphlets of Porta, Besson, Bates, Decaus, and Worcester. It is entitled "*The Jewell House of Art and Nature, conteining diverse rare and profitable inventions, together with sundry newe experimentes in the art of Husbandry, Distillation, and Moulding: faithfully and familiarly set downe according to the author's owne experience. By* Hugh Platte, of Lincolnes Inn, gentleman. London: printed by Peter Short, 1594," (upwards of sixty years before Worcester's Century appeared.)*

The work of 1594, is a small quarto, and consists of three parts, or rather three volumes, for each has a separate title-page; the first contains 96 pages, the second 60, and the third 76: the whole is dedicated to the unfortunate Earl of Essex, to whom Platte remarks that he had long buried (mentally) the contents of the book, but reflecting that all private labor should tend to the public good, he concluded to offer these labors of *his youth* to his country, under the protection of Essex, "because in these daies of deepest censure each author of nouvelties, be they never so really and roially performed, is every way in danger, both of sharp and sodaine reprehension, not only of the base and vulgar sorte of people that measure other men's conceipts by their owne, but of those also that have had some better education, and been brought up even in the same schooles, yea, and under the same tutors with them." He alludes to the jeers of his associates in the law.

In the prefaee he complains of opposition from both ignorant and informed, but, like Savery, he administers some smart fillips. An

* In 1653, an edition was published in which the author is called "*Sir* Hugh Plat, of Lincoln's Inn, knight."

extract or two will convey a better idea of the difficulties inventors then lay under, between two and three centuries ago, than any thing else.—"Because in my late apologie of certeine newe inventions I made a condecionall promise of some farther discoverie in arteficiall concepts than either my health, or leisure, would then permit; I am now resolved, notwithstanding the unkind acceptation of my first fruits, which then I feared and hath since falne out, is a sufficient release in law, of the condition, to make the same in some sort absolute, though not altogether according to the fulnesse of my first purpose, and I am the rather persuaded hereunto that I might both second my first labors with a fresh supplie of credit, as also for the better satisfaction, or rather suppression of all those *professed enemies of ingenious devises*, who, notwithstanding those manifold and inavoidable testimonies produced in the same apologie . . . doe without all wit, reason, or humanitie, not only make a question of the possibility of them, but have both *utterlie condemned them* in their own conceipts, and pronounced their fatal sentence upon them in the midst of *much sacke and sugar*."

Inventors offered wagers to accomplish all they proposed:—"Yet herein I must of necessitie allowe of their grave wisdoms, who, being not able to rule their rash and riotous toungs, have alwaies shewed so great a government ovre their enchanting purses, as that at all times when the question came to be tried by any round wager (which hath been oftentimes offered them in my behalf, and shal stil be maintained in despight of their ignorance,) they have presentlie shifted themselves by an apostrophe to a newe matter, as if they had spoken unawares they knew not what." . . . . . "But to leave these leaden daggers with their golden sheathes to the cutlers' shops, where they would make a goodly shewe if they were hung up in a Michaelmas terme!"

He suggests that governments should patronize inventors:—"Were it the good will and pleasure of her most sacred majestie to propound some liberall stipende for all such of her ingenious subjects as shall bring forth any profitable or rare particular for the general good of his prince and country, I would hope to see a newe revolution of the first golden age."

He refers to Latin, French, and Italian authors who had written on "rare and profitable inventions;" and mentions Albert Magnus, Alexis of Piedmont, Cardan, Mizaldus, Baptist Porta, Firovanto, and Wickerus. He apologizes "for introducing his volume in these florishing, though *unrewarded daies* of skil and knowledge, when *so many editions* of excellent authors concerning the *same subjects* had been published. After observing that most of the foreign authors were untranslated—that much of his own treatise was new and fitted to the understandings of "rustical people, and plain clouted shooes." . . . . . He asks why he should not give his country the fruits of his reading, study, and experiments. He anticipates from well disposed readers a friendly plaudit, which was the most he desired, or a free pardon for his temerity, being the least he could deserve.

The *first* volume, or part, contains one hundred and three experi-

ments, Worcester's Century consisted of just one hundred propositions—hence its name. Platte's book throws light on many things in Worcester's.

The first device relates to keeping fruits and flowers fresh after being gathered; this is the longest article in the book. At the close he tells us he has written a "conceyted booke of gardening," containing many new improvements, but declines publishing till he ascertains what reception his present book meets with; and intimates that if it should be no more favorably noticed than his "Apologie,' (which he compares to the raven sent from the ark,) he will not give it to the public. "It is," he remarks, "all readie for the presse, and does only attende to see if Noah's pigeon (the present work,) will returne with an olive branch, seeing his raven hath as yet brought nothing with her."

2. *A Perspective Ring that will discover all the cards that are neare him that weareth it on his finger.*—This was an invention of some French gambler; it consisted of a hemispherical crystal, or rather of a minute convex mirror, set in place of a gem. The wearer by stretching out his arm, (as if involuntarily,) "leaning nowe and then on his elbow," and other movements, so as to bring the ring into a proper position, could read in it the hands of every player. Platte says the secret was little known in England, because native workmen could not set and "foyle the stone so artificially as it ought to bee." He published the cheat to guard young men from card playing, by showing them one of the "many sleights and cousonages dailie practised in gaming and dicing houses."

4. *To Preserve Meat Fresh.*—The fowl, or flesh, was to be parboiled in a strong brine, after which it would keep fresh for three or four weeks in the hottest weather. He recommends it to seamen who "are forced sometimes to vittaile themselves in climates where no flesh will last sweet four and twentie hours." He mentions a custom of parboiling fowls, &c., in brine, and then placing them in pots filled up with lard, and so preserved for a considerable time.

5. *To Keep Water Fresh at Sea.*— By adding a little "oyle of sulphur;" some preferred oil of vitriol. He mentions distilling salt water as then practiced. Sir Francis Drake, with whom he was familiar, it seems tried various modes of keeping water fresh; "and Captain Plat,* in whom Sir Francis Drake, for his good parts, did alwaies repose great trust," used to hang thick pieces of sheet lead in the centre of each cask; upon those the slimy matter collected, and was removed by drawing up the lead through the bung hole.

6. *A Merchant's Compasse.*—This was a mere indicator of wind; the rod of a vane was continued into a bed chamber, or other room, when an index and card on the ceiling enabled a merchant to ascertain at any time of the night the direction of the wind, and thus calculate the arrival of his ships. The device is inserted in several old collections. Schottus gives a figure of it in his Hydraulico Pneumatica, &c., page 321.

8. *On Secret Writing.*—One side of a letter was to be occupied

* A relative of the author.

with ordinary matters and written with common ink; on the other side confidential subjects were to be written with *milk*. By holding the sheet to the fire the writing became legible. Gall water and a solution of copperas, were also used as invisible inks, and cambric *handkerchiefs*, as substitutes for paper, a lady's ruff, or other white parts of female apparel: another mode was to cut openings through any part of two sheets of paper; one was kept by the writer, and the other by the person addressed. When a secret was to be communicated, the writer laid his perforated sheet over a blank one, and expressed his ideas on the open spaces only, then removing the perforated sheet he filled up the spaces between the openings with ordinary matters, or with words at random. On receiving the letter the person for whom it was designed laid over it his "key sheet," and read the important matter at once. Platte alludes to, but does not describe the mode by which the Romans and Greeks sent orders to their generals, viz., by folding the paper round a short staff, or baton, in a spiral direction, and then writing their directions upon it. On unfolding the sheet the whole appeared in utter confusion.

10. *To Harden Leather, and make it more durable for Pump Suckers.*—This device we have often met with; such early notices indicate an extensive use of common pumps. The leather was to be soaked in water in which iron filings had long lain, or in the water of grindstone troughs. "This," he observes, "has been found of good use by one of the pumpe-makers of our time." He thinks the reader may pump out of it other and better uses.

11. *A Conceipted Chafing Dish, to keepe meat hote upon the table without coals.*—A double dish with a cavity for an iron heater; this seems to have been an old device, and to have given rise to several others: of these Platte mentions "warming pinnes, or froes, which being put into thin cases, and those cases wrapped in linnen baggs, doe serve to heat bedds, and to cast one into a kindly sweat. The like device is used by others in conveying such iron pinns into hollow boxes of wood, first lined inwardly with metal, either to laye under their feete when they write, or studie, in cold weather, or in their coches to keep their feet warm."

12. *How to Roaste Meat more speedily.*—Here we have the portable, or *Dutch oven* of our kitchens. It was not an English device; this its name indicates, and Platte confirms. The particular improvement which gave rise to its present appellation is uncertain. It seems to have been made subsequent to the sixteenth century. This oven, like most of our culinary and kitchen apparatus, is not of modern origin—it is of classical antiquity. The *clybanus* of the ancients, by whom it was made of pottery, iron, and bronze. The *curfew* in its general form and dimensions, so much resembled the clybanus that some antiquarians have deemed both to be one device.

The Dutch oven was made of earthenware and sheet-iron in Platte's time; whether it was first made of tin plate by British workmen, and at his suggestion is doubtful. He describes it as made square, concave, or cylindrical, and either made of tin plates, or of wood, and lined with them, "for the reflexion of the heate that is gathered within

will make great expedition" in the cooking. At each side was to be a slit "to let in the spitte." "I have heard of the like devise heretofore executed by an outlandish potter, in burnte clay, for the which he had his privilege, [a patent] but his devise wanted a cover; it was exceeding heavie, very apt to be broken, and not so strong in reflexion as this metalline devise, especiallie if it be kept clean and bright."

14. *How to turne five Spittes at once by one hande, whereby also much fier is saved.*—Four spits, or prongs, arranged round and united to a central one, to which the crank was attached: in old kitchens when several joints were roasted at once, they were placed one above another on separate spits, hence fire grates of great depth were required. The device obviated this, as well as the corresponding number of turnspits (boys.) The source whence Platte drew the improvement, was "Pope Pius the V, his Kitchen." Bartholomew Scappi, cook to the Pope, wrote a work on cookery which he named the *Kitchen.*

17. *To make a Pistol carry a ball 'point-blank eight skore feet.'*—The barrel was to be *grooved*, like the modern rifle, with eight channels, the bullet "a thought bigger than the bore," and rammed home with "the skowering stick."

20. *To enable any person to walk on precipices, &c., without danger of falling.*—He is to wear a pair of spectacles, the lenses of which are such as enable him to see things close to him only, "for it is the steepnesse that bringeth fear, and overturneth the brain." A person who played some antics on St. Paul's steeple, "did help himself in his desperate attempt," with such spectacles.

21. *A round ball of copper, or laton, that will blowe the fire verie stronglie, &c.*—The eolipile, or philosophical bellows. (The cut resembles the one I have given in my account of Hydraulic Machines, figure 286, on page 569.)

22. *Wooden Bridges* without fastening any timber work in the water.

27. *To handle hot iron, &c.*—Dipping the hand in glue, and then sprinkling horn ashes over it:—glue and alum, &c. (From Cardan and Wickerus.)

29. *To make a candle give as much light as several.*—A double glass globe, the light placed in the inner one, and the outer filled with spirit of wine, or distilled water, like those in chemists' windows. A friend of Platte was shown the device in Venice. Polished reflectors are also suggested. Jewellers at the time used globes filled with water to engrave by at night. A lamp, or candle, being placed behind each. Platte, in his article, speaks of *magic cups*—"drinking bolles with false bottoms, wherein sacke, or claret, wine may be conveyed with fair water onlie in the uppermost part of the cup, whereby a plain meaning man may easilie be deceyved." (See Hydraulics, page 520.)

34. *Ink Powders.*—Copperas, galls, gum arabic, &c., calcined.

37. *Transferring drawings, oiled paper, &c.*—The camera obscura for taking landscapes. The latter he does not explain, because of "the weake faith that reigneth in the world at this time." He pro-

bably took it from Porta's Natural Magic. He here mentions an inferior window glass then made in England.

41. *Speaking by Signs* "to be practiced by such as doo naturally lacke their speech."—Substantially the same as now practised in deaf and dumb institutions. Signs for the letters of the alphabet were to be devised, "but the vowels for the more readinesse thus.—A, upon the tip of your thumb on the left hand; E, upon the tip of your fore finger on the same hand, and so of the rest, so as when you lay the index, or forefinger of your right hand on the tip of the thumb on the left hand; the partie may note the same for an A." He had seen a lady and gentleman converse in this way in a company.

48. *Candles and Lamps.*—The price of tallow was high at the time Platte wrought, hence he advises the poor to make candles by dipping wick made of oakum in rosin, and to use them in the chimney place. He mentions floating lights for bed-rooms, and recommends lamps as far preferable for all purposes to candles. One special advantage was that rats and mice could not convey them into their nests, and set fire to the mats, as they often did with candles!

91. *Oiled Paper in windows in the sixteenth century.*—Thin parchment to be stretched and oiled, by which its translucency was increased. This he recommends in place of oiled paper, because it would not, like the latter, be destroyed by stormy weather; and he thinks it might be used instead of glass in such rooms as are "subject to *overseers*,—i. e. to persons peeping through the windows. Landscapes might be painted on it "to make a pretty shewe in your windowes."

99. *Projection.*—In this article he exposes the tricks by which itinerant jugglers, under the name of alchemists, deluded the unwary. He mentions a German artist over-reaching some young and rich merchants in a very clever manner. As they were on the *qui vive*, he lulled their suspicions completely by proposing that they should make the experiment, and find any thing while he would touch nothing. They, therefore, provided a crucible, coals and the quicksilver, (to be turned into gold.) The fire was kindled, one of them played the crucible under the nose of a bellows, as the juggler directed, another put in the mercury. When the contents were warmed, one of them was directed to give some gentle puffs with the bellows, as if to drive off the scoriæ, or oxide, from the surface of the metal. Then the cheat handed a small paper containing only a *single grain* of the magic powder which was to work the change. In half an hour the crucible was removed, its contents allowed to cool, and an ounce of pure gold was found in the bottom, being the weight of the quicksilver put in!

In this instance the cheat had previously conveyed the gold disguised as an impalpable power, into the *nozzle of the bellows!* The mercury in the process was evaporated, and hence the result. Platte advises every one "besotted with this art," to look out for *false bottoms in crucibles, hollow iron rods,* by which the varlets stirred the metal, *fluxes* in the form of powders, and false backs to chimneys, or such as had a loose brick closely jointed, that might be removed by

a confederate in the next room, and who, on a signal, ["as a hemme (!) or such like watchworde,"] given by the cheat while diverting the attention of the novice with a walk across the room, "and with the volubilitie of toung," may remove and convey some gold, or silver, into the melting pot!

51. *Heating by Hot Water—To Dry Gunpowder.*—Double vessels of lead, pewter, brass, or copper. The powder to be placed in the upper one, and the lower kept supplied with *hot water.*

50. *Cement for broken Glass.*—One part of virgin wax, and two of mastic, or fish glew beat till it becomes clear, dissolved in alcohol. This was used by a Dutch jeweller in cementing two of the queen's crystal cups that were broken; others used isinglass dissolved in Rhenish wine.

92. A *strong Mortar* for building, by mixing waste soap ashes with loam and sand, with a little lime. Some builders used it without lime.

98. *The art of Memory.*—Much the same as now taught. It was taught "by Master Dickson, the Scot, of late yeres in England."

101. A *Portable Wagon* moved by men within it for the use of soldiers. Nothing particular.

102. *A delicate Stove to sweat in.*—The portable vapor bath of modern days. Sweet herbs were placed in a caldron, and the vapor conveyed by a leaden tube into the bathing tub, where it issued through openings in a false bottom.

103. *Refining Sugar.*—Except the vacuum pan, precisely as now practiced. The white of eggs to clarify the syrup. *Clay* put on the moulds, &c., "tempered like pappe with water," &c.

*Tempering Tools.*—In the SECOND PART, which treats of husbandry, he speaks of the value of salt in improving lands, and observes "some kinds of salt doe so harden yron, and doe give such temper to the edges of weapons, as that one may cut yron with them as if it were a piece of wood."

*Boring the Earth.*—To find marl by which to enrich the soil, he says, "I think it necessarie that everie man shoulde have a long augur, or percer, with several large bitts which he may put on and take off at pleasure, and with these he may search at what depth he will, alwaies marking what several veins of earth he fyndeth in the bitt of the augur."

The THIRD PART relates to distillation. He mentions siphons under the name of "crooked pipes," but there is nothing particular worth extracting, *unless* it were processes for making ypocras, and other old drinks!

Platte has none of those ridiculous recipes which disgrace old works, such, for example, as Cardan has given; one of which was to distil an illuminating liquid from the tails of glow worms! The whole is of a useful and practical character. In the part relating to moulding and casting there is nothing particular; flasks and moulds of plaster of paris, sulphur, and wax are mentioned.

The author winds up his book by "an offer of certain newe inventions which he will be readie to disclose upon reasonable considera-

tions, to such as shall be willing to entertain them, or to procure some privilege for them. They are eight in number, but like Worcester's, not fully described."

1. *"A newe kind of Fire."*—He means a new fuel; from the cut representing it, and his description, it was what has frequently been since proposed, viz., a mixture of fine, or refuse, coal and clay worked up into balls of two or three inches in diameter. He says nothing of the materials, as a matter of course, but confines his remarks to the advantages of adopting it. It was *"cheaper* than sea-cole, sweeter in burning, and more regular shaped, being made in the form of balles." It was more *durable*; gave out *no smoke;* will employ thousands of poor persons to make it; will rather promote than hinder the *coal trade;* the materials abundant; will preserve timber for ships by superseding the use of wood for fuel; will reduce the price of fire wood and charcoal; and lastly, if introduced, ten per cent. of the profit may be given to the poor, and to maimed soldiers, &c.

2. *"A vessell of wood to brew, or boile, in."*—He means the old wooden boiler with a cylindrical fire place of sheet iron, or copper, in the middle. If so he was not the inventor, since it was described by Gesner forty or fifty years before, and is found figured in most works on chemistry of the sixteenth century.* It might, however, have been little known in England, or he may have devised a modification of it; of its value he appeals to the proofs in his "Apologie, published Anno, 1593; and if there bee anie person that, notwithstanding my testimonies therein produced, either perversely holds the same to bee impossible, or maliciouslie and slanderouslie reproove the invention of untruth; let him wage such a competent sum of monie as may counturaile (compensate) the discoverie of the secrets, and the author will make a public shewe thereof." He named it an *artificial Salamander.* It was cheaper than copper vessels—one would last twenty years—would save half the fuel usually consumed with others, and could easily be repaired by their owners.

3. *"A boulting hutch."*—A portable grist-mill turned by hand. A figure of this is given, but the interior is not exposed. It has six good qualities: its price moderate—it avoideth waste of meal and flour—saves bolters, which are costly—prevents uncleanliness in bolting. The objections made against it by the London bakers were false and malicious. It is durable, and will not be chargeable for repairs.

4. *"A portable pumpe."*—A figure of this is also given, but the construction is wholly concealed. It is a forcing pump, and a man works it without a lever. It is recommended as cheaper than any pump the author is acquainted with—light and easily transported from place to place by one man—will deliver from four to six tons of water an hour; placed in a tub it can be used for draining fens, or forcing the Thames water into kitchens; and it is recommended to seamen as a good ship pump. There is one feature in the description which renders the rest very doubtful. He says a man may work it five or six hours without intermission, and cannot possibly be

* I have seen it figured in a German work on Distillation, published in 1527.

wearied! His remarks corroborate the opinion that forcing pumps were then little known in England. [See Ewbank's Hydraulics, pages 295, 296.]

5. *A new kind of bread* made in the form of wafers, and very cheap, with a *screw* press worked by a *pinion and cog-wheel*, for stamping, or forming, the wafers.

6. A mode of *banking earth* against the sea, or repairing breaches in canals, &c., with "artificial stones."

7. *Water-proof garments*, light and proof against a continual rain, probably an application of a solution of india rubber, or other gum. Caoutchouc was, however, then but little known, and according to some authors not at all.

8. "*A newe conceit in Peter Works.*"—A device by which half the fuel expended in manufacturing salt-petre could be saved. He offered it to "the peter men" if they would give him one-third of the amount it saved them, but it seems without effect; perhaps an application of his wooden boiler.

The foregoing articles are the whole that appeared to have sufficient interest to be worth noticing. T. E.

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FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

## *Remarks on the Type-Setting Machine.*

Sir,—I perceive in the April number of your Journal, (vol. vii, 3d series, p. 284,) an article giving a description of a type-setting machine, copied from the *Transactions of the Society of Arts*, which seems to me to speak more favorably of it than it deserves.

The last paragraph reads thus:—"When in full work, as many as 8000 letters, etc., have been set up by this machine in an hour; whereas, by the ordinary method, a good compositor can, on the average, set up about 1700 letters in the same time; the wages paid in each case being nearly the same amount."

From reading the foregoing it would seem that the utmost power of the machine was the setting of 8000 letters in an hour; and this number I find, by actual measurement, to be equivalent to 3670 m's, and 1700 (the amount set by a compositor in an hour,) to 780 m's. 3670 m's are 550 more than four compositors could set in the same time, but the distributing and correcting of the types are allowed for in calculating the amount set by a compositor, which is evidently not done on the part of the machine. It is estimated that one hand will distribute about 4000 m's in the same time that he sets 1000, and if so the machine will require one hand to distribute. Each letter must, in the meantime, be set out of the case, and put in the place appropriated to it in the machine, which will require at least three hands, making due calculation for their not having to stop to read copy, these, with the two hands required to work at the machine, make six, as the number required to keep the machine in action. Six hands working at case will set 4680 m's in an hour, which is a little over 1000 more than the machine will do in the same time.

The machine besides setting 1000 m's fewer in an hour than six compositors, will cost a considerable sum, and the price of the apparatus, its wear, and its great liability to get out of order, are not taken into the account, which certainly should have been done.

*Cincinnati, October,* 1844. T. L.

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FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

### *Screens for Carding Engines.*

By page 102 of the February number of the Journal of the Franklin Institute, I observe that letters patent of the United States, have issued to Joseph Munroe, of Hampden county, Massachusetts, for *"the application to carding machines of a screen which will permit the dirt, motes, &c., to escape without the cotton and wool, as described."*

The screen referred to, is, beyond doubt, a very useful appendage to a carding engine, and though it may have been original with Mr. Munroe, it may not be uninteresting to the public to know, that this identical contrivance has been in use at the Rockland Cotton Mills, on the Brandywine, near Wilmington, Delaware, ever since the year 1828, and, though it was not original with us, we can bear testimony to its great utility.

*Rockland, Delaware.* W. WALLACE YOUNG.

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### *Process for Preparing the Purple Powder of Cassius.*

M. Figuier gives the following as a certain process for preparing the above named compound:—dissolve 300 grains of gold in five times their weight of aqua regia, prepared from four parts of hydrochloric acid, and one part of nitric acid; evaporate the solution almost to dryness; this evaporation is requisite to get rid of the acid. The chloride of gold being redissolved in water and filtered, the solution is to be diluted till it measures 26 ounces; fragments of granulated tin are then to be put into it, which becomes turbid and brown in a few minutes; its tint gradually becomes deeper, and at the end of a quarter of an hour it assumes a fine purple color, the precipitate is deposited, and it remains only to collect it on a filter.

It sometimes happens, and especially when large quantities are operated on, that the precipitate does not separate, but remains in the liquid, to which it gives a deep purple color; in this case it is merely requisite to heat the liquid slightly, and to add a little common salt; the product then immediately separates.

When the liquid holding the purple powder in suspension is decanted to separate the excess of metallic tin, care must be taken that no particles of tin, which remain at the bottom of the vessel in the state of a black powder, are poured off with it; it is proper to allow the liquor to settle for some time, and afterwards to decant it; this operation should be repeated three or four times.—*Ann. de Ch. et de Phys.*, Juillet, 1844. Lond. Edin. and Dublin Phil. Mag.